ENGINEERING LIBRARY

November 7, 1949

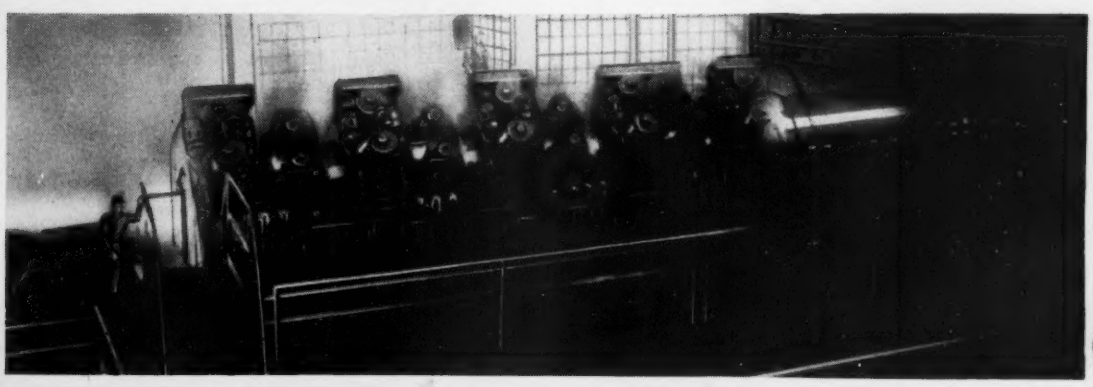
STEEL

NOV 8 1949

The Magazine of Metalworking and Metalproducing

CONTENTS — PAGE 73

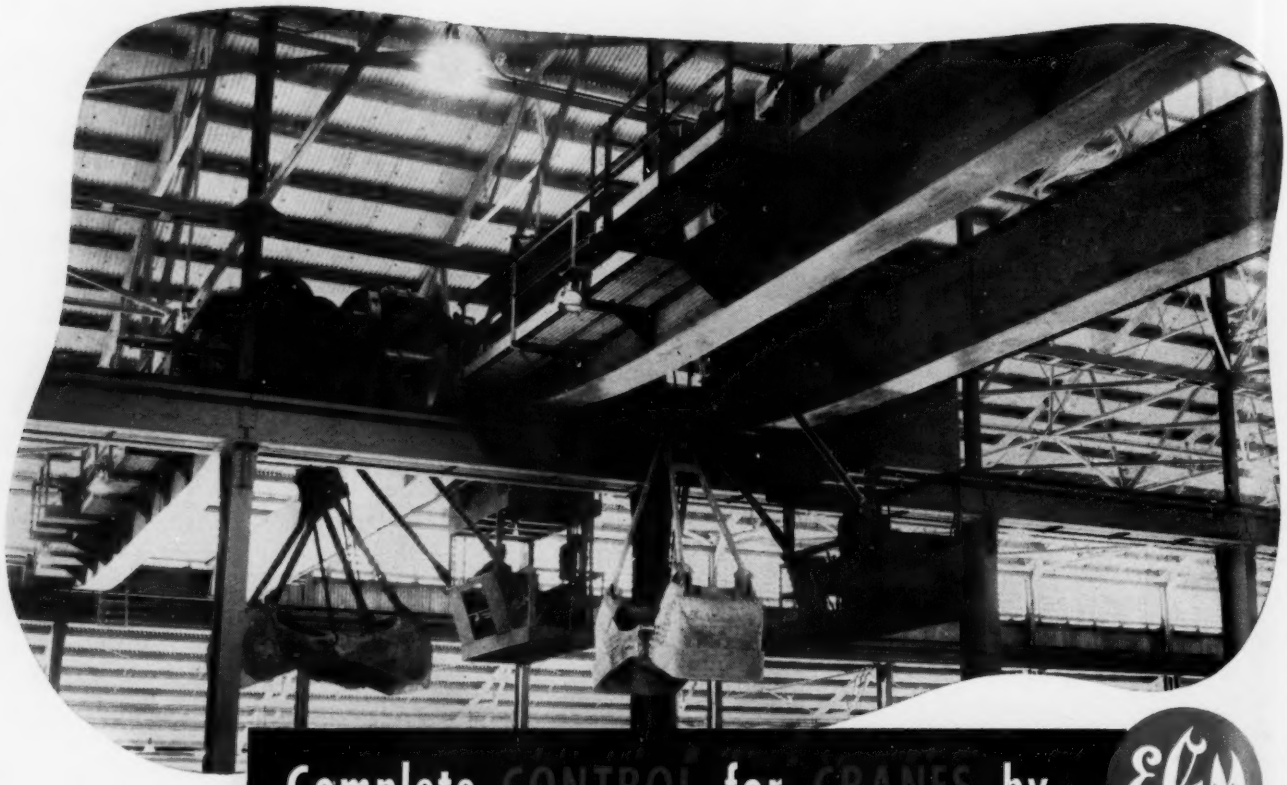
WORLD'S FOREMOST DESIGNERS and BUILDERS OF SEAMLESS TUBE MILLS



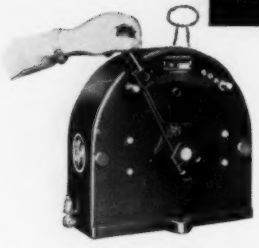
Only Aetna-Standard has the facilities and experience to engineer, build and install *complete* seamless tube mills.

AETNA-STANDARD ENGINEERING COMPANY · YOUNGSTOWN, OHIO

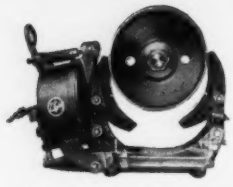
HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLAND
AETNA-STANDARD ENGINEERING COMPANY, LTD., TORONTO, ONTARIO, CANADA



Complete CONTROL for CRANES by E&M



SHORT-THROW Narrow-width Cam Master Switches are easy on the operator.



LONG - LIFE Brakes give high-speed performance — with low up-keep.

SMOOTH Automatic Control with EC&M Frequency Relay Magnetic Controllers.

Users Know EC&M Equipment Gives Top Performance . . . Low Up-Keep

EC&M Crane Apparatus and Control Engineering have a reputation for eliminating initial delays and for permitting production to be maintained at a high level throughout the life of the investment.

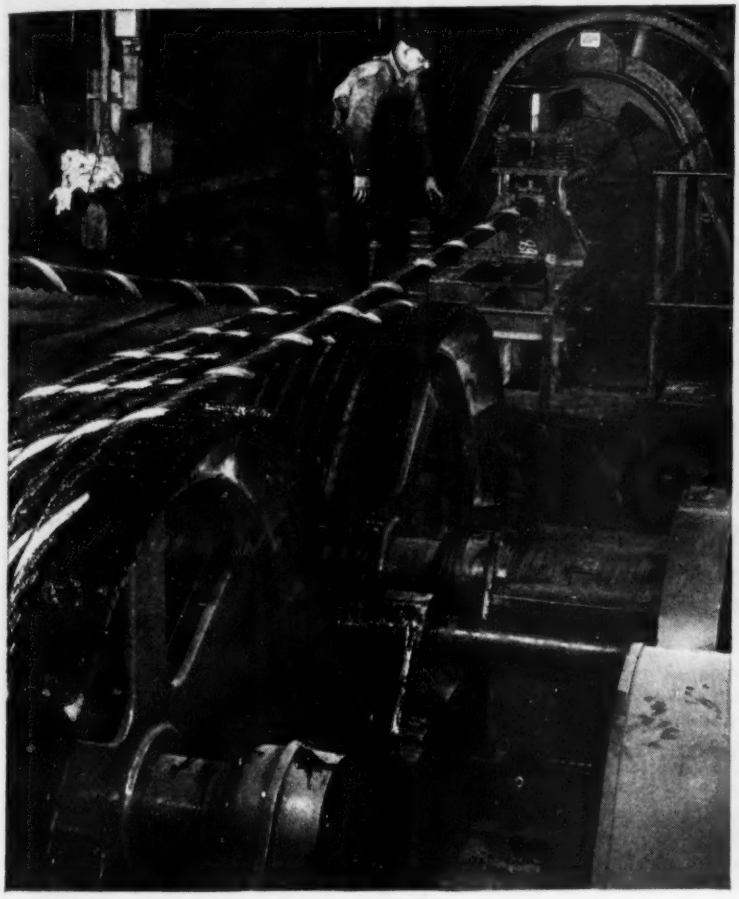
EC&M Crane Equipment is specially engineered for *each* crane. EC&M has *always* built control from the crane data sheet. Relay-settings, resistor-fillings, brake-windings, etc., are matched to the actual crane-loading. Result is top performance right from the start.

Many crane users, when buying new cranes or revamping existing installations, specify EC&M Control. They know the extra margin of safety built into EC&M Equipment and the accurate engineering of the apparatus result in freedom from delays—smooth performance. Write EC&M into the specifications for your next crane.

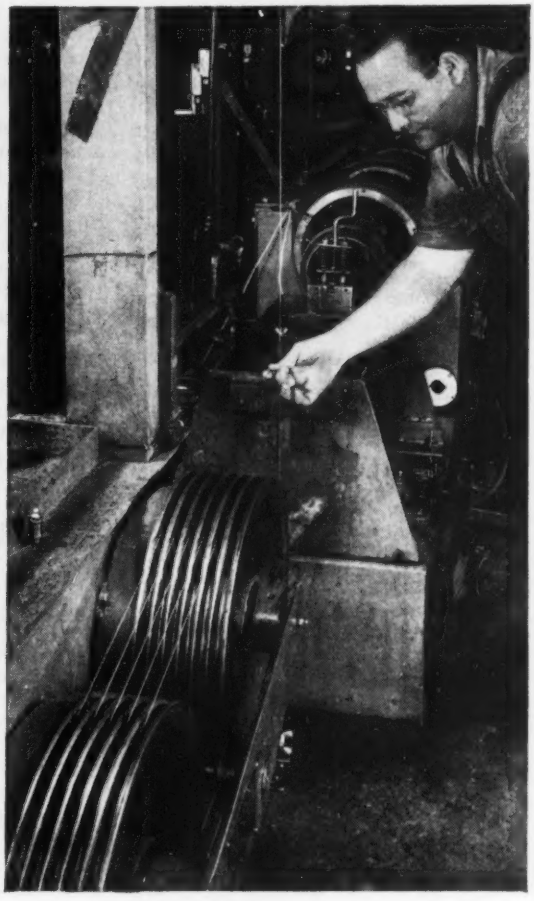
THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

When Buying Cranes ... Specify EC&M CONTROL

This photograph shows a 3 1/8" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



Whether you need

LARGE WIRE ROPE or SMALL WIRE CORD

make your selection from

You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

Macwhyte engineers are always glad to suggest the correct Macwhyte rope or cord best suited to your needs.

Just drop a card or letter to Macwhyte Company or your Macwhyte distributor.

a thousand and one
WIRE ROPES
made by
MACWHYTE

MACWHYTE COMPANY

2912 Fourteenth Avenue **Kenosha, Wisconsin**

Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope.

Mill Depots: New York • Pittsburgh • Chicago
Minneapolis • Fort Worth • Portland • Seattle
San Francisco • Los Angeles

Catalog on request.

Behind the Scenes...

It's Cat Time

Although we managed to pick up a few scratches several years ago when we broached the subject of cats in this column, we will be real brave and point out that this is National Cat Week. Seems more logical that last week should have been picked, what with all the witches, broomsticks and cats we saw around. And since all the rest of the atmosphere of the twenties seems to be blossoming, we should probably be right in tune with the times if we tell you that STEEL is the cat's pajamas.

We Get Around

According to the Chicago Tribune (as reported by *New Yorker*) President Truman has given Etaoin Shrdlu orders to put the heat on Democratic Senators. The *New Yorker* further comments, "Hell, we've known Shrdlu all our life. He couldn't put the heat on a stove." As yet, we can't decide to sue whom for what, because we aren't sure whether we've been insulted. One thing we know is that although we have shaken hands with Harry on a couple of occasions, we didn't receive the orders from him that the Trib said we did. On the other hand, we have been trying to figure out which New Yorker has known us all of our life. That business about the stove is something else again. With the janitor of the Penton building applying the heat, our orange crate desk under the steam pipes is getting mighty warm, and we're about ready to blow a gasket, which should put the heat on something by osmosis.

No News Now

Ten days from the day this is being written, you'll be reading it (if your copy of STEEL reaches you on the date of issue). Somewhere within the next three of four days a news story will develop. Might be the end of the coal or steel strike. Might be a widespread shutdown of industry due to steel or coal shortages. Might even be entirely out of the labor picture. Whatever it is, wherever it is our news staff will be there to cover it. They'll follow it along until it reaches conclusion, or at least until press time. There will be rewrites to be done, layout to be made, possibly charts to be drawn. Within a matter of hours the whole job will be wrapped up, transformed from a group of ideas into a printed page and bound into a copy of STEEL, headed for you. It would be very nice if we could tell you what it will be all about, but the whole point to the story is that we just went up to see the news editors. "What," we asked, "do you folks have cooked up for the November 7 issue?" "Haven't the slightest idea", came the reply.. Which, to our way of thinking, was a very good answer from your standpoint, and from theirs. The only flaw in the whole picture is that it gives us nothing to write about. No special reports in this issue, no long range planning jobs, nothing but top-notch coverage of the latest news in industry, just as it will be made during the days before we go to press.

Even in Utah

Out in Utah the sharp eyes of C. E. Beveridge are working again. He has sent us another mention of Shrdlu in the public prints. This time it appeared in a story about the French political situation, probably referring to one of our French cousins. One of our ambitions is to find it appearing in STEEL, anywhere but on this page. Never have succeeded yet, because our proofreaders have pretty sharp eyes. Even though our publication operates virtually on a newspaper schedule, it's hard to get any slips past the editors and the proof room. Some day we'll catch them, though!

Puzzle Corner

Hope you all found that the gear tooth will hit the vertical position four times as it goes around the large gear. This week we are going to the local butcher for a shady deal. He's an old fashioned character who still uses weights and a balance. We bought a big turkey, which weighed 20¼ pounds. For some reason, it didn't look quite that big to us, so when the butcher wasn't looking, we weighed it ourselves, putting the turkey where the weights had been and the weights where the turkey had been. We found it weighed only 16 pounds. Can you tell us what was the actual weight of the bird?

Shrdlu

(Editorial Index—page 73)

STEEL

Vol. 125—No. 19 November 7, 1949

BUSINESS STAFF

J. W. ZUBER
Business Manager

ADVERTISING

C. H. BAILEY
Service Manager

A. V. ANDERSON
Production Manager

New York:
E. W. KREUTZBERG, K. A. ZOLLNER
CALVIN FISHER, JR.

Pittsburgh:
S. H. JASPER, B. C. SNELL

Chicago:
L. C. PELOTT, V. G. BRETTMAN

Cleveland:
D. C. KIEFER, H. G. ROWLAND
W. L. POLAND

Los Angeles:
F. J. FULLER

•

CIRCULATION

H. E. METZNER
Circulation Department Manager

G. R. EBERSOLE
List Department Manager

Circulation Representatives

D. G. HEWITT, *Manager*
H. R. DUNNE, E. L. FRANKE, C. A. PRICE
J. S. BROWN

•

MAIN OFFICE

Penton Building, Cleveland 13, Ohio
Main 8260

BRANCH OFFICES

New York 17 ..... 16 East 43rd St.
Murray Hill 2-2581

Chicago 11 ..... 520 North Michigan Ave.
Whitehall 4-1234

Pittsburgh 19 ..... 2806 Koppers Bldg.
Atlantic 1-3211

Los Angeles 4 130 N. New Hampshire Ave.
Dunkirk 2-1758

London: 2 Caxton St., Westminster, S.W.1

Published by

THE PENTON PUBLISHING COMPANY

E. L. SHANER ... *Chairman and Treasurer*
G. O. HAYS ..... *President*
R. C. JAENKE .. *Vice Pres., Director of Adv.*
F. G. STEINEBACH *Vice Pres., and Secretary*

Also publisher of
THE FOUNDRY • MACHINE DESIGN
NEW EQUIPMENT DIGEST

Member, Audit Bureau of Circulations; Controlled Circulation Audit, Inc.; and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.
Copyright 1949 by the Penton Publishing Company.

Editorial Staff on Contents Page

EDITORIAL STAFF

E. L. SHANER
Editor-in-Chief

IRWIN H. SUCH
Editor

WALTER J. CAMPBELL
News Editor

WM. M. ROONEY
Market Editor

JAY DEEULIS
Engineering Editor

J. D. KNOX
Steel Plant Editor

GUY HUBBARD
Machine Tool Editor

ALLEN G. GRAY
Consulting Editor

DON S. CADOT
Art Editor

ASSOCIATE EDITORS

WALTER F. TOERGE
DAN REEBEL
VANCE BELL
FRANK R. BRIGGS

ASSISTANT EDITORS

HENRY J. HOLTZ • DOLORES K. MAILLE
JOHN S. MORGAN • L. J. SKUDERIN
EDWIN L. KARPICK • M. T. BORGERHOFF
EDWARD C. BIRKNER

RESIDENT EDITORS

E. C. KREUTZBERG
Washington Editor

B. K. PRICE
Eastern Editor, New York

L. E. BROWNE
Associate Editor, New York, Boston

J. C. SULLIVAN
Pittsburgh Editor

A. H. ALLEN
Detroit Editor

E. F. ROSS
Chicago Engineering Editor

HOWARD C. TUTTLE
Chicago News and Market Editor

VINCENT DELPORT
European Editor, London

EDITORIAL CORRESPONDENTS

R. W. KINCEY, *Birmingham*
L. C. FELDMANN, *Buffalo*
SAMUEL S. CARR, *Cincinnati*
MAC L. HUTCHENS, *St. Louis*
GEORGE R. REISS, *Youngstown*
BERT D. LYNN, *Los Angeles*
ROBERT BOTTORFF, *San Francisco*
R. C. HILL, *Seattle*
C. K. CATES, *Dallas*
F. S. TOBIN, *Toronto*
J. A. HORTON, *Birmingham, Eng.*
LEON JAUDOIN, *Paris, France*
JACQUES FOULON, *Liege, Belgium*
HERBERT GROSS, *Dusseldorf, Germany*

MAIN OFFICE

Penton Building, Cleveland 13, Ohio
Main 8260

BRANCH OFFICES

New York 17 ..... 16 East 43rd St.
Murray Hill 2-2581

Chicago 11 ..... 520 North Michigan Ave.
Whitehall 4-1234

Pittsburgh 19 ..... 2806 Koppers Bldg.
Atlantic 1-3211

Detroit 2 ..... 6560 Cass Ave.
Madison 3024

Washington 4 ..... 1123 National Press Bldg.
Executive 6849

Los Angeles 28 ..... 1452 N. Seward St.
Hudson 2-4439

London 2 Caxton St., Westminster, S.W.1

Business Staff on Page 4

NEXT WEEK . . .

Engineered Expansion Pays Off in More Efficient Production

Process Speeds Up Welding of Copper to Other Metals

Oxygenated Air—A Factor in Industrial Gas Combustion

Production of Stainless Steel—III

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 125, NO. 19 NOVEMBER 7, 1949

NEWS

Study Pension Impact on Costs 81
Lone Star Builds Steel Mill 83
Portsmouth Steel Sold 83
Boost for Building Seen 84
Dictating Machine Applications, Sales Increase 85
British Drive for Canadian Markets 86
Machine Tool Sales Up, Future Promising 86
Nodular Iron Output Promises To Expand the Industry 87
★ Windows of Washington 88
Europe's Industry Must Do More Research 91
Coal, Steel Strikes, 40-Hour Week Dim Railroad Buying Prospects 92
★ Calendar of Meetings 93
★ Mirrors of Motordom 95
Acquisition of Falls Spring & Wire Planned by Standard Spring 98
★ Briefs 99
★ The Business Trend 101
★ Men of Industry 102
★ Construction and Enterprise 206

PRODUCTION-ENGINEERING

★ Production and Engineering News at a Glance 109
How Chromium Plating Affects Fatigue Life of Aircraft Steels 110
Cupping Thick Steel Blanks—I 112
Centrifugal and Vacuum Investment Casting of Close-Tolerance Parts from Difficult-To-Cast Alloys 116
Simultaneous Grinding and Checking Cuts Processing Time 118
Wiremakers Exchange Ideas on Carbide Die Practice 120
New Laboratory Concentrates on Steel Valve Research 122
Physics of Powder Metallurgy Discussed at Symposium 127
Flame Fabricating Structural Steel 128
★ Progress in Steelmaking—Production of Stainless Steel—II 132
★ Letters to the Editors 168
★ New Products and Equipment 173
★ Helpful Literature 181

MARKETS

★ Market Summary 183
★ Metal Prices and Composites 184
Zinc and Copper Sales Increase 190

★ *Advertising Index* 214

Editorial Index available semiannually; STEEL also is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18

★ Denotes Regular Features.

A PRETTY THIN STORY

We're speaking of rolling aluminum. The thinner you roll it, the further it goes, the wider your market possibilities.

Morgoil Roll Neck Bearings have proved to be a mighty important factor in rolling aluminum thin. Some mills are rolling it down to .00025" at a very fast clip. This requires the accuracy and precision found *only* in Morgoils.

Now let us tell you about the new Ball Thrust Morgoil for bearings 18" and less, being used on both new and old mills. Write today.

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS

English Representative
International Construction Co.
56 Kingsway, London, W. C. 2, England

MB-11

MORGAN
WORCESTER
ROLLING MILLS · MORGOIL BEARINGS
WIRE MILLS - GAS PRODUCERS - AIR EJECTORS
REGENERATIVE FURNACE CONTROL

MORGOIL
ROLL NECK BEARINGS

November 7, 1949

What Price Security?

Agreement by Bethlehem Steel Co. and the United Steelworkers of America-CIO on a pension and insurance package which in many respects is more liberal than the terms recommended by the President's fact finding board is a climactic event which probably will usher in a new era of labor relations for large segments of American industry.

Pensions and other forms of social security are not new by any means. Hundreds of companies have been introducing them for many decades. The significance of the Bethlehem agreement, following so closely upon the heels of the Ford Motor Co. settlement, is that it was consummated under circumstances which are almost certain to force thousands of other employers in many industries to provide similar benefits for their employees. Henceforth, for most industrial companies, pensions and insurance will become a "must," instead of a benefit bestowed upon employees on the free initiative of progressive employers.

Time alone will decide whether the "shotgun wedding" aspect of the Bethlehem agreement was a good way to launch pension and insurance plans in industrial America on a grand scale. It is a foregone conclusion that widespread adoption of plans comparable to Bethlehem's will create endless complications, some of which may be serious. It is quite probable that a year or two from now the representatives of government, USA-CIO and steel company management who were principals in the current negotiations will wish heartily that more time had been afforded to study the problem before hasty binding action was taken.

Right now the immediate problem is to resume operations as rapidly as possible after management and union representatives have agreed upon terms. Next will come the determination as to what extent the higher hourly burden will necessitate higher steel prices. Later the impact of the new agreements upon employment practices will be felt. Somewhere along the line the reconciliation of government welfare plans with those financed by private employers and employees will come up for new consideration.

In most of these pending questions lurks the danger of ever increasing government intervention in the affairs of corporations and individuals. Are we buying artificial and perhaps even false security at the stiff price of serious loss of corporate and personal freedoms?

* * *

ONLY 52 PER CENT VOTE: Tomorrow is election day. Because in most sections of the United States the issues to be decided at the polls are of local rather than national significance, the vote in relation to the number of qualified or potential voters probably will be light.

This prospect that large numbers of citizens will not exercise their opportunity or perform their duty to vote is discouraging. Even in the 1948 Presidential election, when important national issues were at stake, the total vote cast was only 47 million out of a population of more than 90 million persons with ages of 21 years or more. The vote in 1948 was less than that cast in 1944 or 1940.

Immediately following the 1948 election, many authorities attributed Mr. Truman's victory to the support given him by labor union members and farmers. More recently various studies of the 1948 vote have indicated the strong possibility that Mr. Truman won because hundreds of thousands of persons who did not favor him did not vote. The number of automobile dealers, independent grocers, members of Chambers of Commerce, doctors, dentists and even industrial-

(OVER)

AS THE EDITOR VIEWS THE NEWS

ists who did not vote or who were not even registered is appalling.

Unless a higher percentage of persons who are naturally opposed to the present socialistic trend in government vote or learn to get out the vote by 1950 and by 1952, this nation certainly will follow the fate of Britain.

* * *

RAILROAD OUTLOOK DIM: A roundup of opinion as to the volume of buying by railroads in the near future shows that rail transportation executives are beset by vexing uncertainties. They have not had enough experience with the 40-hour week under normal conditions to calculate its real effect. They cannot be sure as to how seriously inroads on traffic by truck, water and air transportation will affect their business in the long run. They have suffered tremendous losses as a result of the coal and steel strikes.

In the face of these troubles, one cannot expect a cheerful prospect of rail and equipment buying by the roads in 1950. The backlog of railroad car orders dropped from 103,896 as of Jan. 1, 1949 to 22,203 on Oct. 1. Freight car awards, which totaled 1568 in January, were only 123 in September. Right now, the anticipated needs for cars, locomotives and rail for 1950 are disappointingly low.

This drab outlook could change. Check it again three or four months hence—after the devastating effects of the strikes have worn off. —p. 92

* * *

IDEAS TO LOWER COSTS: Everything that is happening today accentuates the incentive to cut costs. In a single automobile manufacturing establishment, no less than 96 technical committees are studying ideas for reducing costs. Any idea that looks promising is tested in one plant or department. If the test shows the idea is practical, it is put into effect in all units where it is applicable.

In one plant a change in containers saved a million dollars a year. In another an idea to increase tool life saved $191,000 in 12 months. In a third, a change in workmen's gloves saved $71,703 per year. One automobile company saved $1 per car by using a less complicated ignition switch.

Management never should make the mistake of thinking it has touched rock bottom on costs. Ingenuity and resourcefulness always can find a way to save. —p. 95

* * *

UNCLE SAM—BIG BANKER: Reconstruction Finance Corp. rapidly is becoming one of the country's most important lending institutions. At the end of August it had $416 million in business loans outstanding. During the first eight months of 1949 applications were made to RFC by 7078 corporations for loans totaling $958 million. RFC approved loans for 2873 applicants amounting to $383 million—an average of $133,310 per loan.

Most of the publicity attending the agency's loans centers upon loans of $10 million or more. In reality, more than 90 per cent of the loans involve less than $100,000 and many are for a few thousand dollars. Most loans are for debt retirement, working capital, plant construction and equipment. A fundamental requirement for an RFC loan is proof that the credit applied for by the borrower cannot be obtained at banks or elsewhere at reasonable terms.

At the rate these loans are increasing, some interesting and delicate questions of governmental policy are bound to arise whenever a sizable loan goes sour. —p. 88

* * *

HEAT TO AID MACHINING? At the meeting of the American Society of Tool Engineers held at Montreal last week, J. R. Roubik of Kearney & Trecker Corp., Milwaukee, and Sam Tour of Sam Tour & Co., New York, participated in a session on "hot machining."

The theory of hot machining is that if the work piece can be heated momentarily at the cutting area, the tool can remove metal faster and with less power than if the metal were unheated. Mr. Roubik experimented with a gas flame unit on a milling machine and Mr. Tour experimented with a lathe on which an induction heating unit traveled just ahead of the cutting tool.

Results of both experiments will encourage further study. Perhaps heat, as an adjunct to cutting tools, may prove to be profitable, especially in connection with hard, tough metals. —p. 86

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

PENSIONS UP COSTS— Add $4 a ton to the cost of producing steel. That's what steelmakers believe the generous pension-insurance programs will mean (p. 81). Will prices go up? Producers hope not. If they do, increases likely will be made on a product basis, not across the board. Chances for downward price adjustments in steel and many metalworking products—in sight last summer—probably have been scuttled by the social benefit settlement . . . Metalworking companies with low steel stocks may face poststrike curtailments. (p. 82) . . . The coal stoppage now becomes the No. 1 obstacle to resuming a high level of industrial production.

STEEL EXPANSION— Look for moderate expansion in the steel industry during the 1950s, but nothing like the growth of the 1920s when capacity increased by about 25 per cent. An output of 100 million tons is readily conceivable for certain years in the next decade, but not as an average for the entire ten years, says Walter S. Tower, American Iron & Steel Institute. Latest individual expansion programs (p. 83) are planned by Lone Star Steel Co. and Portsmouth Steel Corp. Lone Star will build a $52.5 million mill in eastern Texas. Portsmouth will install a hot-rolled sheet and strip mill and an electric weld pipe mill at Portsmouth, O. Detroit Steel Corp. will acquire Portsmouth's physical assets and business Jan. 1, 1950.

U. S. CAPITAL FOR INDUSTRY— A $36 million loan from Reconstruction Finance Corp. enabled Lone Star to schedule its expansion. The government is gaining as a source of capital for business and industry (p. 88). Since the first of the year, the number of RFC loans approved has more than doubled; dollar value of the grants has more than tripled. The agency had $416 million in business loans outstanding on Aug 31.

PENSION FUNDS AS CAPITAL SOURCE—Watch for still another development in the matter of sources for industrial capital. Delegates to an American Institute of Steel Construction meeting heard (p. 84) that the funds accruing in large union-won pension programs may become an important origin for investment dollars. This and other factors assure adequate mortgage money for the next few years. All types of construction this year will reach a record peacetime total of almost $19 billion.

CAPITAL EQUIPMENT—The business skies are partly cloudy but clearing up for capital equipment makers (pp. 86, 87). Machine tool sales to small shops are increasing. The outlook is promising when this round of strikes is over because industry then will more than ever need cost reducing equipment. But you will have to fight harder for capital goods business in Canada as Britain drives for Dominion markets.

RAILROADS—If all or part of your volume is dependent upon railroad purchasing, your outlook is uncertain (p. 92). Railroads are moving cautiously in ordering equipment and supplies because it is unusually difficult now to estimate the transportation future. This is the case because of the new 40-hour week, competition from other forms of transportation, labor's demands and loss of revenue from the coal and steel strikes.

COST REDUCTION— Automakers are plugging up compressed air line leaks, switching work gloves, doing anything to cut costs and offset a labor bill which has more than tripled since 1939 (p. 95). Progress in the drive is indicated by the fact that motor vehicle prices have risen only 93 per cent since 1939 while average weekly wages climbed 130 per cent.

HERE AND THERE IN INDUSTRY—A major overhaul of patent laws is likely in the next session of Congress (p. 90) . . . Kaiser-Frazer is beginning to tool up for its new light car (p. 95) . . . The new nodular graphite gray iron promises to expand the gray iron industry (p. 87) . . . European industry must do more research (p. 91) . . . The dictating machine industry is now doing a $25 million to $30 million business, 270 per cent greater than the 1939 total (p. 85).

Wring the DEAD WEIGHT Out of Your Product

With HI-STEEL . . . sections can be smaller yet stronger

Your product can be lighter, stronger, and longer lasting if it is made of HI-STEEL. Inland HI-STEEL permits the use of much greater unit stress in design and has 50% greater ability to stand up under impact loads than ordinary structural-grade carbon steel. That's why, with HI-STEEL, sectional thicknesses can be reduced without sacrificing strength. In fact, sections that are reduced less than 25% are actually stronger, as well as lighter.

In addition, HI-STEEL has about five times the atmospheric corrosion resistance of ordinary structural-grade carbon steel and is far more resistant to abrasion. It can be worked hot or cold with little or no change from standard shop practice.

Write for booklet. INLAND STEEL CO., 38 South Dearborn Street, Chicago, Illinois. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

HI-STEEL meets the requirements of SAE Specification 950.

INLAND HI-STEEL

REG. U. S. PAT. OFF.

THE LOW-ALLOY HIGH-STRENGTH STEEL

STEEL
A PENTON PUBLICATION

Study Pension Impact on Costs

Steelmakers see social benefit settlement costing $4 per ton of finished steel. Hope to avoid general price increase. Smaller companies in quandary

WILL I have to pay more for steel? This is the question troubling metalworking executives as they study the pension-insurance settlements being drawn to end the 5-week steel strike.

Steelmaking costs of the large basic producers will rise about $4 per ton of finished steel on the average as result of the added cost of the social security benefits granted. For some companies the increase will be substantially more. For those companies which already had pension programs, the increase may be less.

Will the producers be able to absorb the increase, or will they pass it along to consumers? Steelmakers are wary of making firm predictions. Most say unofficially they hope to avoid any general increase in prices, that renewed attention will be given to cost cutting in an attempt to hold prices down.

If increases in steel prices do become necessary, such adjustments probably will be made on a product basis rather than across the board.

Betters Fact-Finders' Plan — Cost of the pension-insurance settlements will be higher than the settlement recommended by the steel fact-finding board which suggested the companies grant $200 a year per worker (10 cents per hour on a 2000-hour year basis) for the purchase of insurance and retirement benefits. Although estimates of the cost of the packages now being granted vary widely, representative agreements for the larger companies are figured at around 12 to 14 cents an hour.

May Set Pattern—The steel agreements are interpreted as establishing a pattern for company-financed social security benefits which may filter down through the metalworking and other industries.

Complexities of the pension settlements delayed a quick ending of the strike.

Following the announcement of the Bethlehem agreement Oct. 31, other companies called in their actuaries and pension consultants to restudy figures for their companies in light of the Bethlehem agreement.

Smaller Companies Demur — A number of the smaller companies protest that the pattern established by the larger companies will not fit their situation at all. They contend they cannot afford the generous benefits, that many of them lost money in the third quarter even though operations were at a fairly high level. They insist that differences in size, methods of operation and financial history must be taken into consideration.

The Bethlehem Plan

Bethlehem's agreement with the United Steelworkers provides for noncontributory pensions and contributory social insurance. It represents a compromise in the prestrike positions of both the union and the industry.

Bethlehem's settlement is effected through amendments to the company's 26-year-old pension program, a noncontributory plan which provided $50 monthly pensions. Under the amended plan, Bethlehem workers with 25 years of service will receive a minimum of $100 a month, including federal social security. Workers with 15 years or more of service will receive proportionately lower benefits.

No Maximum—Basic formula used in computing pensions under the Bethlehem agreement: One per cent of worker's average monthly earnings for ten years preceding retirement multiplied by the number of years of service, plus his social security benefits. The plan places no upper limit on pensions. If federal social security benefits are increased, workers entitled to more than the minimum pension will benefit.

Insurance Cost Shared—Workers and company will share equally in the cost of a social insurance program, estimated at 5 cents an hour. This represents a compromise by the union which earlier had insisted on noncontributory insurance plans.

Pension Cost Unknown—No ac-

PRESIDENT MURRAY GETS A BREAK AT CIO CONVENTION
. . . . in timely announcement of Bethlehem pension settlement

curate estimates of the cost per man-hour for pensions under the Bethlehem plan are available. Mr. Murray estimated that it might be between 10 and 12 cents an hour. So many variables exist in pension planning that exact estimates are impossible.

Independent actuaries agree that the total cost of pensions for steelworkers under the Bethlehem plan will exceed—and possibly double—the 6-cent an hour estimate originally made by union consultants and adopted by the steel fact-finding board.

And Now the "Hangover"

The worst may be yet to come. That's the feeling of metalworking executives who expect further production curtailments for lack of steel.

Some metalworking companies already have cut back operations because of dwindling steel supplies. Immediate resumption of steel production would not start the flow of material in time to prevent curtailments by an even greater number of consumers.

Here's why: The first material to reach a consumer after a steel strike settlement may not be what is most critically needed. All steel mills will not resume work at the same time. While facilities at some mills remained in good condition during the strike, the facilities at others, particularly older equipment, did not hold up. Evidence of this was the collapse of some open-hearth roofs.

Coal Is Problem—Even if steel mills do get back into production, some of them may soon feel effects of the long work stoppage of the coal miners.

Although some consumers have had to curtail production because of their dwindling supplies of steel the curtailments have not yet been widespread since the bulk of metalworking plants (as reported in STEEL, Sept. 19, p. 46) had from 30 to 60 days' supply of steel when the steelworkers' strike began Oct. 1. Companies holding more than a 30 to 60 day supply far exceeded those holding less.

Automakers Curtail—Plans of automobile companies for suspending assemblies because of short supplies of steel were left generally unchanged by the Bethlehem Steel Corp. strike settlement:

Ford—Bethlehem is its major supplier—still plans to stop most manufacturing operations Nov. 11, final car and truck assemblies the following week. Chrysler made no change to halt assemblies of its Dodge, DeSoto and Chrysler cars at the end of last week and of its Dodge trucks this week. Suspension of Plymouth assemblies is still expected around Thanksgiving Day. Chrysler points out that it buys steel from many different firms and that until all are back it will be impossible to make plans for resuming production. General Motors Corp., which buys only a small proportion of its steel from Bethlehem, still expects a slowing down of operations. Plans of Nash-Kelvinator to suspend car assemblies about the middle of November at its plant at Kenosha, Wis., still stood.

More Shutdowns Expected — Other independent auto companies are expected to be able to run until late this month. Some interruption of assemblies can hardly be avoided at that time even if all steel companies resume operations soon. Time needed for finished steel to move from the mill through the parts makers' factories and the auto companies subassembly departments to the final assembly line is usually estimated at from four to six weeks.

Other companies cutting production include: Oliver Corp., from five to four days at Charles City, Iowa, and Springfield, O.; Seeger Refrigerator Co. down to three days at Evansville, Ind.; General Electric Co. which suspended refrigerator output at Erie, Pa.; Maytag Co. which cut Newton, Iowa, washer plant from 53-hour week to 40-hour; General Motors Delco Products Division at Dayton, O., down to four-day week; and Midland Steel Products Co., Cleveland, effecting a gradual reduction.

Coal Now Big Worry

The coal miners' strike may become the No. 1 worry of the metalworking industry. After several months of coal miners' work stoppages, the nation's stocks of coal have been reduced to a point beyond which further shrinkage will inflict a slow freeze on steel production and other industrial operations.

Pointing up the seriousness of the coal situation is the statement of Leigh Willard, chairman, Interlake Iron Corp., Cleveland, that his company, although having had a large stock of coal, is now being forced to slow down and that a continued tie-up at the mines for another week or ten days would lead generally to "a very critical situation."

At Youngstown steel mills have only two weeks' supply of coal.

Coal stocks among steel producers in the Pittsburgh and Wheeling districts vary from 40 to 55 days at near capacity operations. This is adequate to prevent mill shutdowns if the coal strike is ended this month.

At Detroit, coal stocks of Great Lakes Steel Corp. and Ford Motor Co. are ample to support steel operations through the winter.

October Jobless Increase

Secondary unemployment resulting from the steel and coal strikes hiked the October jobless to 3,576,000, 225,000 higher than in September. Total civilian employment last month was 59,001,000, 410,000 below September's level, Commerce Department says.

U. S. Offers Pension Report

"Pension Plans" is the title of a 140-page mimeographed report just compiled by the Division of Industrial Relations, Bureau of Labor Statistics, Labor building, Washington.

CIO Launches Three-Way Drive Against Communists

The CIO in its Cleveland convention last week ousted the leftist United Electrical Workers, formed a new group and gave it the jurisdiction formerly held by the old UE, barred left wingers from its top executive board.

Formally kicked out of the CIO with the old UE, which claims a membership of 450,000, was the Farm Equipment Workers, another leftist group which merged its claimed 60,000 members with the UE in defiance of CIO instructions that it amalgamate with the United Auto Workers.

The new UE will be officially called the International Union of Electrical, Radio and Machine Workers-CIO. Initially, it will be run by a 12-member committee headed by James B. Carey, CIO secretary-treasurer, who was president of the old UE until ousted in 1941 by a Communist-dominated clique. The new union will have its organization meeting Nov. 28 in Philadelphia. Mr. Carey says his group will start with a nucleus of 230,000 members in locals who have seceded or will secede from the old UE.

Convention action denies membership in the CIO's top governing body to Harry Bridges, head of the International Longshoremen's Union; Ben Gold, leader of the Furriers Union, the only board member who admits he's a Communist; and a few others.

Lone Star Builds Mill

A $52.5 million steel plant will be constructed in eastern Texas. RFC to help finance it

LONE Star Steel Co., Dallas, will build a steel mill in eastern Texas. Detailed plans and specifications are being released to prospective bidders.

Estimated construction cost is $52.5 million for a plant to include four 188-ton open-hearth furnaces with an annual steel ingot capacity of 500,000 tons; one 110-in. slabbing mill; one four-high 72-in. reversing hot-strip mill; and a line for manufacture of 350,000 tons per year of electric-weld pipe up to 16 in. in diameter.

The company has a commitment from Reconstruction Finance Corp. for a first mortgage loan of $36 million toward the financing of the project. Additional funds for operating capital during the construction period have been arranged for from local banks. Suppliers of equipment and contractors interested in doing the construction have indicated a willingness to take a portion of their money in long-term debentures.

Lone Star estimates that when the new facilities are completed, its total properties will be worth more than $90 million.

Group Leases Apollo Mill

The old Apollo, Pa., sheet mill facilities will resume operations Nov. 7 under the name of Whitney-Apollo Corp. These facilities recently were sold to M. N. Landay Co., Pittsburgh, which is leasing the mill to Whitney-Apollo. Interests behind this latest effort to start up the old Apollo mill are said to be three former members of the Phoenix-Apollo syndicate.

Monthly capacity represents 10,000 to 12,000 tons of hot-rolled sheets, while galvanizing facilities are capable of about 4500 tons monthly. Arrangements have been made to purchase sheet bars from Portsmouth Steel Corp. and Empire Steel Co. It is estimated about one-quarter million dollars will be necessary to put the hand sheet mills back into operation. About 600 steelworkers will be employed.

Pig Iron Rate Higher

BLAST FURNACE operations edged up to 75.1 per cent of capacity in September from 74.7 per cent in August, but the output tonnage dropped because of the shorter month. September's production was 4,351,155 tons, second lowest total this year. Included in the total are 4,307,747 tons of pig iron and 43,408 tons of ferromanganese and spiegeleisen.

RECORD: This open-hearth department of Weirton Steel Co. set a world's record last month. Its 12 open hearths produced 200,379 ingot tons. Best previous output was 182,772 tons also turned out by the National Steel Corp. subsidiary, in March, 1949. Weirton began operating a giant 550-ton open hearth in September. The company, whose workers have an independent union, was not struck in October, normally a peak production month

In the first three-quarters of this year blast furnaces have operated at 86.5 per cent of capacity to yield 506,706 tons of ferromanganese and spiegeleisen and 45,136,368 tons of pig iron for a grand total of 45,643,074 tons. The monthly average which has been on the decline in the last few months will take a sharp drop in the next report because most producers were shut down by the strike for all of October.

District blast furnace production in September and for the first three-quarters of 1949 follows:

	——Net Tons——	
District	September	Nine Months
Eastern	835,416	9,035,850
Pittsburgh—Youngstown	1,589,403	17,017,739
Cleveland—Detroit	447,266	4,555,792
Chicago	968,078	9,735,072
Southern	348,985	3,529,076
Western	162,007	1,769,545
	4,351,155	45,643,074

Record Output for Armco Plant

A NEW alltime high record for steel production was set in October by Armco Steel Corp.'s East Works, Middletown, O., says L. F. Reinartz, assistant vice president.

This was made possible by the combined output of the electric melting department's biggest monthly tonnage to date and a near-peak output by the open-hearth department. During the month when most of the country's steel plants were strike-bound, the Armco East Works made about 1000 more tons of ingots than ever before.

Portsmouth Steel Sold

To Detroit Steel Corp., effective Jan. 1, 1950. Ohio producer to expand finishing units

DETROIT Steel Corp. will acquire the physical assets of Portsmouth Steel Corp. Jan. 1, 1950. The agreement calls for expansion of Portsmouth's present finishing facilities.

Portsmouth's properties include steel producing units at Portsmouth, O., and two coal mines in eastern Kentucky. The Portsmouth works include 108 by-product coke ovens, a blast furnace and ten open-hearth furnaces which have an annual ingot capacity of 720,000 tons. This is supplemented by a blooming mill, billet, rod and wire mills and equipment.

Detroit and New Haven Plants—Detroit Steel operates cold-rolled strip mills at Detroit and New Haven, Conn., with a combined annual capacity of 210,000 tons. Its Reliance Steel Division processes and distributes flat-rolled steel products. Its Craine-Schrage Steel Division operates a steel warehouse in Detroit.

The facilities, management and personnel of Detroit Steel and Portsmouth Steel will be consolidated into a single corporate unit, without interrupting the continuity of Portsmouth's operations. The 1948 sales of the two companies aggregated $88,639,000.

Portsmouth Expansion—The agreement contemplates expansion of finishing facilities at the Portsmouth works through installation of a hot-rolled sheet and strip mill and an electric weld pipe mill. The hot mill will produce hot bands for the cold-rolled strip mill at Detroit and skelp for the new pipe mill at Portsmouth. The Ohio river location of the Portsmouth works provides ready access to major pipe markets of the Southwest. The new mills are scheduled for completion late in 1950.

Portsmouth was formed in 1946 when it acquired Kentucky coal properties and Ohio steel facilities from Wheeling Steel Corp. Part of Portsmouth's original financing was provided by Kaiser-Frazer Corp. which was seeking a steel supply. K-F disposed of its Portsmouth holdings in mid-1948. Present deal must get stockholder approval.

Boost to Building

More financing seen through industry pensions, a source of mortgage money

BROAD industry pensions would provide an important source of mortgage money for new building operations. Coupled with other factors this money assures plentiful financing for new construction, said Earl B. Schwulst, president of the Bowery Savings Bank, New York. He spoke at the American Institute of Steel Construction convention in White Sulphur Springs, W. Va., Oct. 31-Nov. 3.

If union-won pensions become widespread in industry, large funds will eventually accrue. Administrators of this money will seek investment opportunities, particularly in capital construction.

Immediate Outlook Good—The immediate outlook for capital is also good, said Mr. Schwulst. From new money alone the four major types of savings institutions will have about $7 billion to put to work in the next year. Reserves of private insurance companies are increasing at $3.5 billion a year and shares in savings and loan associations by about $1.6 billion annually. Time deposits in commercial banks and savings bank deposits combined also are increasing at $1.6 billion annually.

The building industry is partly insulated against future deflationary conditions, Mr. Schwulst believes, by planned government spending on public works. Government-subsidized housing will become more important.

Industry Not Strike-Crippled—The steel strike failed to cripple building operations in October, N. R. Patterson, institute president, reported. But the strike will cut steel fabricating shop bookings below the 2 million tons fabricated in 1948. So far most of the 50,000 workers in fabricated structural steel have been kept on the job because of large steel inventories.

Mr. Patterson cites these bright spots in construction outlook: Revival of skyscraper office building; many housing developments financed by insurance companies and banks; increased construction of steel bridges —2000 are now being built or were just completed; sport stadium construction; airport building. High costs constitute the major danger to large industry volume. Contracts for hospitals, schools, churches and low-priced housing are still scarce.

The Long View

FINANCED by the $60 life-savings of his friend, Capt. Henry Lomb, John J. Bausch opened a small optical shop in what is now the Reynolds Arcade Bldg. in downtown Rochester, N. Y. That was 96 years ago last Tuesday.

Today, on the threshold of its 97th year the company is known as one of the world's leading producers of scientific optical instruments.

During the Civil War Captain Lomb kept sending his Army pay to keep the company going while John Bausch built and installed the first American power lens grinding machine.

Construction Peak Seen

Construction this year will reach a record peacetime total of almost $19 billion, says Dwight W. Winkelman, president of D. W. Winkelman Co., Syracuse, N. Y., and immediate past-president of the Associated General Contractors of America.

Speaking before a meeting last week of the American Society of Civil Engineers, he said that even this expenditure is not meeting construction demands in many fields. Need for more highway and airport construction is pressing. Construction costs are stabilizing or declining slightly on a national scale. They are now about 10 per cent below the postwar peak of last fall. Contractors report adequate supplies of materials, machinery and manpower. Productivity and efficiency have increased, competition is keener.

Boomlet Bloom Fades

The boomlet in general business reported by purchasing executives in August and September petered out in October. The full impact of the coal, steel and aluminum strikes has not yet been felt by all industry, says the National Association of Purchasing Agents.

Should the mines and mills go back to work at once, the supply line vacuum already created will slow many manufacturing operations for several months before production of the basic materials can fill the postponed order schedules.

In October, the production increases of the previous two months were shaved down 14 per cent. Back-order positions declined to about the July figures. Prices for the most part remained steady. Purchased inventories continued to drop overall, although 22 per cent reported increases, the highest number since June, 1948. Re-employment has slowed down. Buying policy is cautious and of short range.

Washer Sales Mount

Manufacturers of household washers sold more units in September than at any time since October, 1948.

Washers sold in September totaled 357,281, an increase of 10.3 per cent over August's 323,789, says American Home Laundry Manufacturers Association. September sales ran 17.6 per cent behind September, 1948, the industry's alltime high month. Compared to September, 1941, washer sales in September, 1949, were up 146 per cent.

Manufacturers sold fewer ironers in September than in August. September ironer sales totaled 27,700, compared to 32,300 sold in August, a drop of 14.2 per cent and 25.7 per cent below September, 1948.

Television Demand Not Met

About 265,000 television receivers were produced in September. Of this number, the Radio Manufacturers Association says its member companies turned out 224,132 sets in the four work-weeks of September, compared with 185,706 in the five work-weeks of August.

Both television and radio set production is running behind demand. RMA members made 1,402,840 television receivers in the first nine months of 1949, more than three times the number during the like 1948 period. The total output of TV receivers in the last four years is estimated at more than 2,750,000.

Electricity Needs Soar

Nation's electric utility industry will see the greatest demand in history for electric power this winter with a margin of 11.5 per cent to spare.

This margin of generating capacity over maximum anticipated demand for electricity is the largest since the 12 per cent margin of 1946. It compares with a reserve of only 5.9 per cent last December and 5.4 per cent at the end of 1947. This summary is contained in Edison Electric Institute's semiannual survey of the power situation.

There is no expectation of any power curtailment in the nation except in the Pacific Northwest where low river flow has reduced hydroelectric operations. By the end of 1950 the normal generating reserve capacity of 15 per cent is expected to be reached.

Sees Upturn in Copper, Brass

Fourth quarter business of the copper and brass industry will show substantial improvement over third quarter and this higher level of activity will continue into the first three

months of 1950, Roger E. Gay, president, Bristol Brass Corp., Bristol, Conn., predicts.

Mr. Gay estimates fourth quarter shipments at 480 million pounds, comparing with actual third quarter shipments of 376 million pounds and 541 million pounds for the last three months of 1948.

Mr. Gay looks for a slight dip in business late next spring but expects that 1950 copper and brass shipments will exceed the estimated total of 1550 million pounds for 1949. Due to a drop in business early this year, the 1949 volume was off considerably from the 2150 million pounds shipped in 1948.

Expansion Below 1948 Pace

Industrial investments totaling $5.9 million were announced in Chicago during October, compared with $16.5 million a year ago. Chicago Association of Commerce & Industry says this total will be spent for new buildings, additions and land and building acquirement by 22 companies including three newly organized firms.

Plant outlay amounts to $87.8 million in the first ten months of this year. In the like period of 1948 the total was $131 million.

Housing Boom in San Francisco

Lower prices for new homes are spurring construction in the San Francisco area. Prices have dropped 5 to 8 per cent since last spring. Buyers are rushing to take advantage of the decline for they fear it will be only temporary.

October construction ran about 30 per cent above that a year ago. Most of the homes are selling for less than $10,000.

Reductions in the costs are attributed to greater efficiency of labor, better planning, more competition among subcontractors.

L.A.'s Manufacturing Grows

Growth of manufacturing facilities in Los Angeles county is proceeding at a rate far more rapid than last year.

According to the Industrial Development Committee of the Los Angeles Chamber of Commerce, plant constructions and expansions during the first nine months of 1949 totaled $80.3 million.

This is an increase of 38 per cent over the $58.1 million for the same period last year.

This year's total includes 145 new factories, among them three national manufacturing firms which transferred their headquarters to Los Angeles, and two others which opened western branch plants there.

Even scouting notes at football games are recorded as . . .

Dictating Machine Applications, Sales Increase

"TAKE a letter, Miss Smith." This remark, or something like it, has been voiced with increasing frequency since 1837 when shorthand was invented. It will be heard even more now that Miss Smith is getting mechanized.

She is receiving help from an industry manufacturing $25 million to $30 million worth of dictating and voice recording equipment yearly. This volume is 270 per cent greater than the 1939 total, will increase even more in 1950.

Cost-Cutting—The cost-cutting potentials in voice recording equipment account for spectacular sales gains. There are 30 times more office employees than 50 years ago, only seven times more manufacturing workers. Tests show that a man, who supposedly takes an hour for dictating to a stenographer, actually spends only 15 minutes in dictating, the other 45 minutes in ruffling through papers, answering the telephone and dealing with other interruptions.

Machines today are lighter, more compact than a year ago. They can be used on an automobile battery, in hotel rooms, at home, even at football games (see cut.)

Improved manufacturing techniques have held production costs generally to slightly below what they were a year ago. Producers make most of their own parts.

Remote Ancestor—The granddaddy of most types of dictating machines today is a sound-recording device developed by Thomas A. Edison in 1877. Up until the late 1930s the entire dictating machine industry was built on mechanical acoustics—a speaking tube carried the voice down to actuate a small diaphragm which recorded on wax cylinders. Dictaphone Corp. and Thomas A. Edison Inc., producing this type, were alone in the field until application of electronics to recording equipment broadened the industry.

Now manufacturers of electronic dictating machines use various methods of recording media—wires, tapes, disks and cylinders. A postwar research and development program has brought a host of new refinements in the past year which have increased acceptance of mechanical dictation.

Bank Machine Introduced

Burroughs Adding Machine Co. introduced a new bank accounting machine last week at the American Bankers Association convention in San Francisco.

The device is designed to help handle a bank bookkeeping job that has doubled in the past ten years. Almost 2.5 billion checks were written against the 85 million checking accounts in the U. S. last year, about double 1938 volume.

The working surface of the Burroughs machine consists essentially of a number keyboard flanked on the right by three controls, labeled "checks," "deposits" and "balance." The machine automatically selects the proper columns on the customer's statement, prints the date, counts checks, tells the operator if the customer has overdrawn and by how much and computes and prints the new balance.

British Drive for Canadian Markets

Expand capital goods sales effort in Dominion, with government backing. Warehouses to carry stocks of tools, parts in effort to match American service

SUPPLYING goods or equipment to the Canadian market? If so, be ready for intensified competition from British firms.

This warning was issued by Victor M. Drury, president and chairman of the executive committee, Canadian Car & Foundry Co., Montreal, speaking at the American Society of Tool Engineers meeting in Montreal Oct. 27-29. His remarks were primarily about machine tools because of the composition of his audience, but apply equally to other capital goods.

Speaking of the machine tool situation, Mr. Drury said: "We Canadians long have been good customers of the American machine tool industry, but now it looks as though you men will have to fight harder for our business. British engineers are on the eve of a fierce drive for Canadian orders.

"On Oct. 20 London announced that the British government is getting behind the engineering industries in this development. Let me assure you that the British are deadly serious. Months ago the British sent a delegation to Canada to survey our market. It was, perhaps, the grimmest group of business men from the other side that we have yet greeted."

British Mean Business—The British say Canadians turn too much to the U. S. for engineering equipment, Mr. Drury continued, and intend to change this picture. Canadians will be assaulted by a corps of top-flight salesmen to be permanently located in the Dominion. These salesmen will be supported by warehouses carrying large stocks of machines, tools and repair parts to match American builders in speed of delivery and service on machines.

Emphasis during the meeting's technical sessions was on economical tooling for short run production, a problem which prevails in Canada because of limited markets as compared to the U. S. Many of the suggested solutions are also important to small and medium size shops in this country.

Special Tools from Standard Units—One solution to this problem is building up special machine tools out of standardized units which can be reassembled to suit other jobs when a limited run is finished. This practice is recommended by C. P. Farr, chief engineer, Modern Tool Works Ltd., Toronto, Ont. To illustrate this theory, Mr. Farr used slides of a nine-way drilling and reaming machine, a drilling and spot facing machine and several others tailored to suit certain jobs but adaptable to others.

Something new in machine shop practice and a source of considerable interest at the meeting was the session on "hot machining" conducted by J. R. Roubik, Kearney & Trecker Corp., Milwaukee, and Sam Tour, Sam Tour & Co. Inc., New York.

Faster Cutting with Less Power—The theory behind hot machining is that cutting involves heating action; if the work piece can momentarily be heated at the cutting area, the tool can remove the metal faster with less power. Mr. Roubik's experiments have been conducted on a milling machine equipped with a gas flame heating unit. Mr. Tour has done his work on a lathe with an induction heating unit traveling just ahead of the turning tool. Results in both cases encourage belief that heat as an adjunct to cutting tools may be in the offing, especially in connection with hard, tough materials.

Rubber Ruler

AN AUSTRIAN refugee now living in Hartford, Conn., 25-year-old Joseph Gerber, has invented a variable scale which professors and industrial men call the most revolutionary engineering aid since development of the slide rule in 1620.

The device is 12 inches long, made of anodized aluminum. It's fitted with a triangular coil spring which, when extended or contracted, spaces intermediate points proportionately. Fully compressed the spring has 100 markings to an inch.

Used in relation to fixed basic scales, it solves problems of spacing, proportion, interpolation. It multiplies or divides distances, enables reading of blueprints that have shrunk, permits engineers to use any desired scale, translates one system of measurement into another. It's not a slide rule, is not intended to replace one. The "rubber ruler" is sold by Gerber Scientific Instrument Co., Hartford.

Machine Tool Sales Up, Future Promising

MACHINE tool sales are picking up, particularly to smaller shops. This is the "state of the union" situation reported at the 25th annual meeting of the American Machine Tool Distributors Association in Cincinnati, Oct. 31 and Nov. 1.

The future holds promise, AMTDA believes, of even larger volume when this round of labor trouble is over. Then, industry big and little will more than ever need cost-reducing tools.

The growth of the machine tool and press manufacturing industry is indicated in the expansion of AMTDA which, from a small beginning in 1924, now has over 150 members.

Taft Speaks—Sen. Robert A. Taft (Rep., O.), who spoke at the convention, said American capital equipment expansion is being throttled by government's double taxation of industry. Corporations must pay high taxes, then their employees have to ante still more on their earnings from the corporations. The first step to stimulate industry to continue its traditional growth will be to make a cut in corporate taxes. This should be followed by a cut in individual levies. Senator Taft also advocated more liberal laws for obsolete equipment. Even in Great Britain, where ultraconservatism on such matters supposedly rules, machine tools may be written off for taxation purposes at the rate of 40 per cent per year.

Johaning Elected—At the close of the meeting Robert L. Giebel, president, Giebel Inc., New York, handed over the gavel to O. W. Johaning, president and general sales manager, Colcord-Wright Machinery & Supply Co., St. Louis, who was elected 1949-50 president of AMTDA. Other new officers are E. B. MacDonald of Syracuse Supply Co., Syracuse, N. Y., as first vice president; E. J. Seifreat of Seifreat-Elstad Machinery Co., Dayton, O., as second vice president; and George B. McClennen of Delta Equipment Co., Philadelphia, as treasurer. Thomas A. Fernley Jr., 505 Arch St., Philadelphia, continues as executive secretary.

Rising Tool Sales Forecast

Rising sales curve for the machine tool industry is forecast by L. D. McDonald, vice president, Warner & Swasey Co., Cleveland, and president,

National Machine Tool Builders Association. He told a conference of Warner & Swasey district managers that peacetime competition and return of buyers' markets provide the solution to the problem of war surplus machine tools.

He says that up to now the nation's metalworking plants have been operating "for the most part with older machine tools which are outproduced by today's models." More than half of the plant equipment used today was built prior to the war and much of the remainder is of wartime vintage representing engineering designs frozen almost ten years ago. These machines are no match for current models, Mr. McDonald concludes, and there would be an upward trend in machine tool sales today if it were not for hesitation due to current strike situations.

Company Celebrates 75 Years

Cincinnati Bickford Tool Co., Oakley, Cincinnati, O., manufacturer of upright, jig boring, and radial drilling machines, announces its 75th anniversary by transmitting to the machine tool trade an anniversary folder and a direct reading power chart.

The "Direct Reading Power Chart and Drilling Time Indicator" provides a convenient time saving, pocket-size visual calculator for use in estimating and engineering departments.

Free ECA Listing for Small Firms

IF YOU are a "small independent enterprise" and want to get business under the Marshall Plan, you are entitled to free listing in a directory to be compiled by the Economic Cooperation Administration.

The directory, printed in the languages of the various participating countries, will be distributed by ECA. Small firms are asked to register from Nov. 10-30. Application forms are available at Commerce field offices.

States Raise, Introduce 58 Taxes

SWEEPING changes in 52 important taxes were made by state legislatures in 1949. All the changes were upward, says Commerce Clearing House, Chicago. Six states tapped new sources of revenue by new taxes.

1949 State Tax Changes

Source of Taxes	Number of States Increased	New
Gasoline	15	0
Cigarets	9	2
Liquor	10	1
Personal income	8	0
Corporate income	6	0
Sales, gross income and/or use	4	3
	52	6

Nodular Iron Output Up

New cast product promises to expand gray iron industry, society told at Chicago meeting

INCREASED production of nodular graphite gray iron next year will permit more engineering components to be made as castings. This new cast product promises to expand the industry, speakers told the Gray Iron Founders' Society meeting in Chicago, Oct. 27-28.

Nodular iron will not replace much gray iron or any other foundry metal, said Charles Donoho, American Cast Iron Pipe Co., Birmingham, but it will enable more products to be cast. Nodular iron provides a metal for castings which require properties between those of gray iron and steel. The society's committee on nodular iron warned that its production needs close laboratory control.

Activities Outlined — Other activities of the society were outlined, including sales promotion, work in progress on the gray iron handbook, the technical program, changes in terms and conditions of sale, publication of cost manual, completion of the annual wage rate survey and inauguration of a safety program.

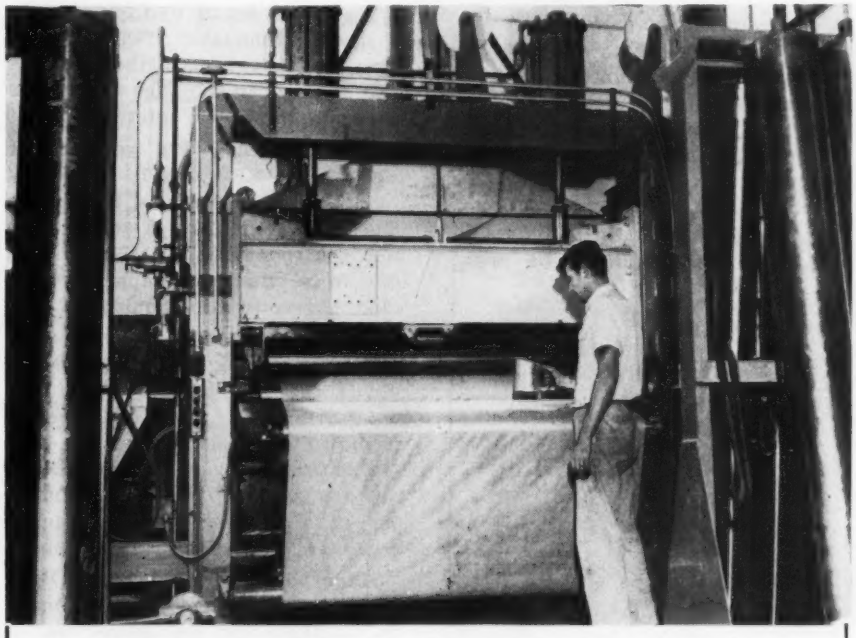
Speakers at the meeting told society members to move slowly in the study of pensions. Everett M. Dirksen, Pekin, Ill., a former congressman, deplored bigness in industry and government. Both can become so large that they pass optimum point of efficiency.

Officers Elected—Society officers re-elected are: President, Hermann P. Good, superintendent, Textile Machine Works, Reading, Pa.; secretary, Robert G. Schaefer, board chairman and treasurer, Schaefer-Goodnow Foundries Inc., Pittsburgh; treasurer, Henry J. Trenkamp, president, Ohio Foundry Co., Cleveland; executive vice president, Raymond L. Collier, Cleveland. Newly elected as vice president was H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J.

Elected to the board of directors were: George R. Holmes, McIagon Foundry Co., New Haven, Conn.; R. W. Foster, Bay City Foundry Co., Bay City, Mich.; E. B. Christensen, Paxton-Mitchell Co., Omaha, Nebr.; E. N. Harrison, Harrison Foundry Co., Chattanooga, Tenn.; and J. Scott Parris Jr., Richmond Foundry & Mfg. Co., Richmond, Va. Mr. Good was re-elected to the board.

Students Given Job Outlook

SOME 800 engineering seniors of the University of Wisconsin got their first look at today's engineering job opportunities when the university held its first Job Engineering Forum on the campus.



REHABILITATED: Developed for making wartime "Bazookas," this machine is now being used for manufacture of power transformers at the General Electric plant in Oakland, Calif. Only slight alterations were made to adapt the machine for making paper cylinders on which transformer coils are wound. It's all part of a $2 million modernization program at the GE plant

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Government gains as a source of capital. RFC is not governed by same factors as banks are in making loans. Small companies have 1 to 2.5 chance to get money

QUIETLY but inexorably the government is gaining as a source of capital for business and industry.

The trend is particularly pronounced so far this year. Since Jan. 1, the number of loans approved by the Reconstruction Finance Corp. has more than doubled; dollar value of the loans has more than tripled. RFC had $416 million in business loans outstanding at the end of August, which places it high among the country's biggest lending institutions.

But That Isn't All—With the growth of its lending activities has come a profound change in the government's policy on business loans. The principal objective in the past was to stabilize the economy by getting behind private lending concerns. RFC loaned out billions in the great depression of the 30s to promote recovery. The money was advanced largely to banks so they could liquidate their positions; after that banks were able to resume their old function of taking care of the financial needs of the community. But this year the new trend—approving huge loans which banks will not make because they believe the risks are too great—is pronounced.

The record seems to warrant this conclusion: If you want to launch a big new industry, if you are in distress, or if you need money for expansion—and a bank won't extend financial aid—you have at least an even chance of being able to get the money from RFC.

You don't have to seek far for the explanation of this loan policy. RFC is not guided in its business loan policy by factors which must be considered by a private banker. RFC does grant loans in accordance with requirements set by Congress.

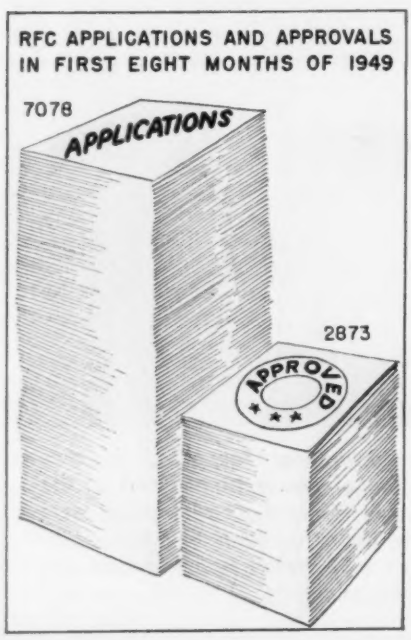
If you want to borrow money from RFC, you must meet these requirements: You must show that the credit applied for is not otherwise obtainable on reasonable terms; you must satisfy the RFC that there is reasonable assurance of repayment; and you must show that the loan will contribute to the maintenance or increase of production and employment.

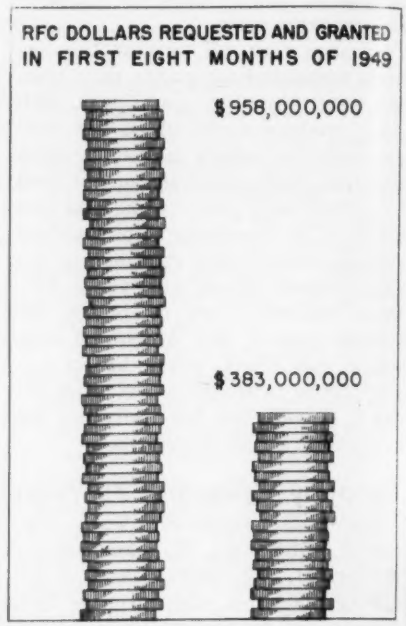
That's All There Is to It—If you encounter resistance, a call from one or more congressmen or from an administration brass hat, explaining that a loan would be in the public interest, often seems to help. And that is no reflection on RFC, which is manned by men of high character and ability. But they have to remember at all times that theirs is a public institution set up by Congres with a specific mandate. When a loss turns up they are in the clear as long as they can show the money was loaned in the public interest.

What happens when you do not repay your RFC loan? Like any other lending institutions, RFC sends experts to your plant in an effort to help you straighten out your affairs. The worst that can happen if you can't pay up is to be liquidated.

What would happen if some of the large outstanding loans went sour? Would the government step in and take over the plants and operate them? Those questions have been speculated. In view of the magnitude of some of the loans, future policy in regard to plants in insolvency proceedings bears watching.

Many Loans Are to Small Business—While the big RFC loans make the headlines well over 90 per cent of RFC's loans involve less than $100,000. Many of them are for a few thousand dollars. Any small company, as shown by the ratio of loan applications to approvals, has a 1 to 2.5 chance of getting money from RFC. Most loans are for these purposes: Debt retirement, working capital, plant construction and plant equipment. The number of small companies applying for RFC loans is increasing by leaps and bounds. Here's how they grew in the first eight months of the year:





1949	Applications Made	Dollars Asked (in millions)	Loans Approved	Dollars Loaned (in millions)
Jan. ...	568	$139	218	$25
Feb. ...	789	85	259	35
Mar. ..	906	145	370	37
Apr. ...	817	130	337	38
May ...	877	98	416	60
June ..	913	97	427	48
July ..	943	133	376	64
Aug. ..	1265	131	470	76
Total ..	7,078	958	2,873	383

Alaskan, Okinawan Defense

ALASKA and Okinawa defense construction, passed by Congress and signed by the President, authorizes $166.5 million for housing, sewers, roads, electric power equipment and other improvements for maintaining defense forces.

Guided Missiles Research

PRESIDENT Truman signed the act authorizing construction by the National Bureau of Standards of a guided missile research building at a cost of $1.9 million. No work on the project can be undertaken until an appropriation is granted.

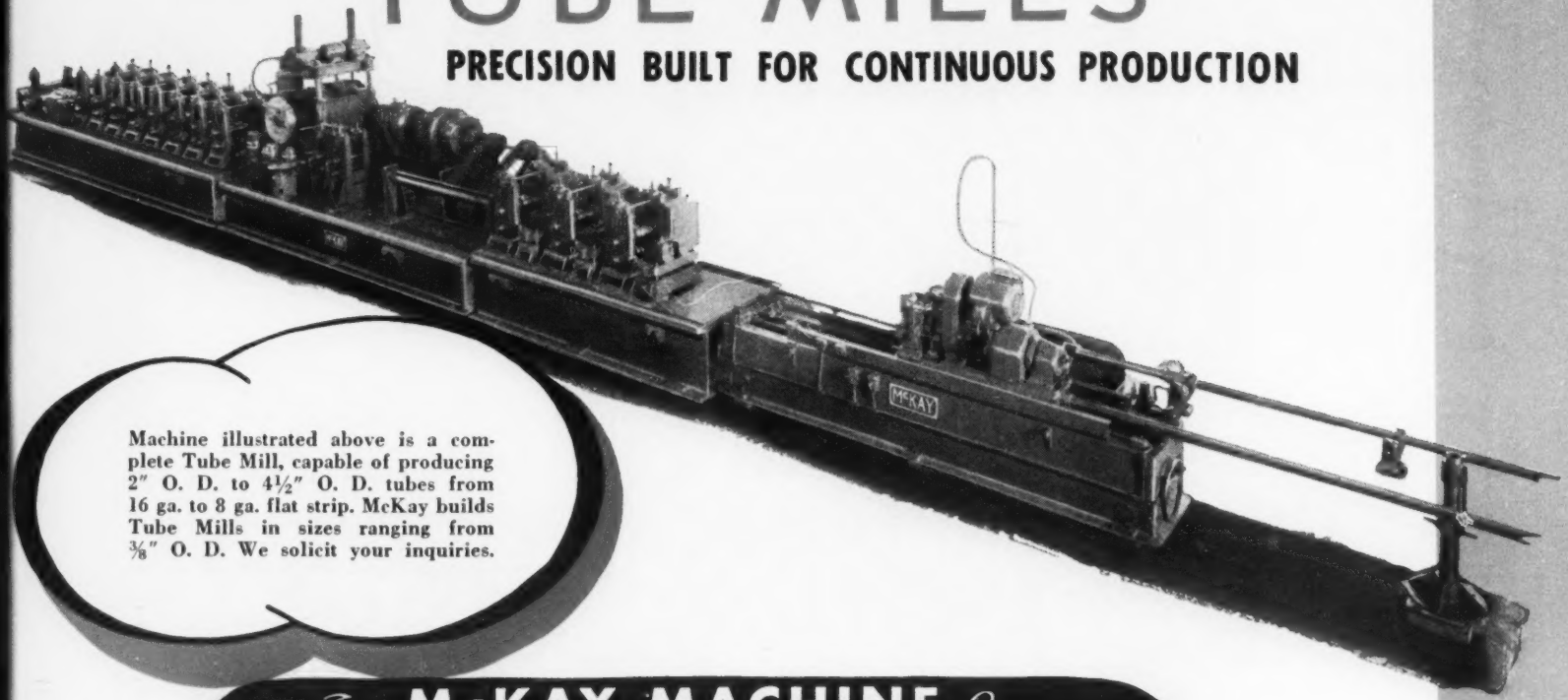
1400 More Miles of Railroads

NEGOTIATIONS paving the way for construction of 1400 miles of railroads

McKAY

RESISTANCE WELD TUBE MILLS

PRECISION BUILT FOR CONTINUOUS PRODUCTION



Machine illustrated above is a complete Tube Mill, capable of producing 2" O. D. to 4½" O. D. tubes from 16 ga. to 8 ga. flat strip. McKay builds Tube Mills in sizes ranging from ⅜" O. D. We solicit your inquiries.

McKay Electric Resistance Weld Tube Mills can be put to work quickly and easily in your plant. Your present dependable personnel, after instruction, will become entirely competent to operate a McKay mill.

This has been accomplished by:

1. Simplifying and centralizing all necessary controls.
2. Complete protection through approved safety devices and interlocks.
3. Supplying motor drives and push button controls to essential heavy duty motions.
4. Eliminating necessity of welding from coil to coil — strip from coil threads itself through machine, without manual assistance.
5. Automatic Rotary Head Cut-off (patent pending) producing lathe cut and accurately maintaining desired lengths.
6. Providing simple, easy means of changing rolls for other tube sizes.
7. Typical rugged McKay construction insures high production with a minimum of maintenance.

The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY

The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

to link the systems of Alaska and British Columbia will be opened shortly by the State Department with Canadian authorities. If Canada agrees, the President will order the making of a survey and the drafting of plans and cost estimates. Actual construction could be begun only after further legislation by Congress.

New Quartermaster Research Lab

A NEW LABORATORY to be erected by the Army Quartermaster Department will be used for all research and testing except on food items which will continue to be conducted at the existing laboratory near Chicago.

The new laboratory will have facilities for research work on such things as clothing, shelter and steel hand tools. In passing the measure Congress ended the fight between Philadelphia and Boston as the site of the new plant. Selection was left to a committee to be appointed by the Research and Development Board. Only thing certain is that it will be in the eastern part of the United States. Work cannot be started until the appropriation is granted; that will be requested next year.

Standard Bureau's New Editions

METALLURGY Division of the National Bureau of Standards is preparing to issue new editions of outmoded circulars now that it has caught up with a backlog of work left over from the war.

One, says Dr. John G. Thompson, division chief, will be a complete revision of the comprehensive circular, "Nickel and Its Alloys," which was revised last in 1924. Another will be a revision of the circular, "Heat Treatment and Properties of Iron and Steel," published in 1936. In an advanced stage is a new circular to be called "Solders and Soldering."

Work is being resumed on the pure iron project. In 1937 the division, by chemical purification, produced iron of 99.99 per cent purity, the only metallic impurity being a trace of copper. Work on metal powder is being pushed so metal powder specifications can be worked out. X-ray studies of metals are being continued; emphasis is on high and low-temperature properties, fatigue and mechanism of fatigue, and on formation and propagation of cracks in welded steel. The studies of underground corrosion continue to be pushed; emphasis is on cathodic protection. Other corrosion investigations involve metal in aircraft construction and light metals used in building exteriors. Now in the hands of the editorial committee is another report on what has happened to ferrous piping after prolonged underground use in the Washington water system.

New achievements by the Division of Metallurgy include development of a gage to permit continuous measurements of reduction of area of test pieces immersed in a cooling bath for the determination of low-temperature properties. This new gage is to be described in the bureau's Journal of Research for November.

Patent Laws Due For Overhaul

NEXT major overhaul of the patent laws is scheduled to start in January when the Senate Judiciary Subcommittee on Patents, Trademarks and Copyright Laws will launch exhaustive hearings on S. 2518.

Introduced by Sen. Alexander Wiley (Rep., Wis.) at the request of the Milwaukee Patent Law Association, its announced intention is to do away with uncertainties that have grown out of recent Supreme Court decisions. The measure has stirred up considerable controversy, and the inclusion of jokers has been charged.

Chief provisions are these: There shall be no criteria of patentable invention or discovery other than novelty. Determination by the commissioner of patents as to what constitutes novelty shall be final. In any patent action, the claim of the patent shall constitute and determine the scope of the invention covered thereby, and a claim based on functionality "shall cover the corresponding structure or acts described in the specification and equivalents thereof." The bill defines infringement, and identifies the arguments which cannot be used as defense in damage suits for infringement.

Manganese and Mica Barter

EXCHANGE of 1 million tons of American wheat for Indian manganese and mica, now being negotiated by the State Department, may be the first barter deal under a Commodity Credit Corp. charter amendment.

It permits CCC to improve its bad inventory situation by trading surplus agricultural commodities for strategic and critical materials. The wheat deal would make only a small dent; it would take about one-seventh of the stored wheat. The agency's inventory now comes to $1.1 billion and includes surpluses of 19 agricultural products.

Senate Plans Thorough Study

SOCIAL SECURITY expansion bill which was passed by the House will not get perfunctory treatment in the Senate. The Senate Finance Committe augmented its staff to conduct a thorough study of the 201-page House bill. Also, interested parties will be asked to state their views before the committee in January hearings. The committee hopes to report a bill in time for Senate action next year.

You'll Hear About Pollution

MANUFACTURERS whose plants are located along rivers and other inland waters will learn about water pollution almost immediately.

Congress appropriated $1 million for federal aid to states, interstate groups and other agencies to conduct surveys of pollution caused by industrial wastes. The Public Health Administration already allocated the entire amount to be spent in 49 of the 53 states and territories authorized by Congress to receive such aid, and the same act appropriated $200,000 to help defray the cost of planning antipollution projects.

Consolidation Off to Good Start

CONSOLIDATION of like units in the Bureau of Foreign and Domestic Commerce is off to a good start.

Three commodity branches of the Office of International Trade, created to handle special export problems during the war and in the mandatory controls period after the war, were merged with three opposite numbers in the Office of Domestic Commerce of which H. B. McCoy is director. The three ODC units are the Machinery and Transportation Equipment Division—William L. Beck, chief; the Iron and Steel Division—Frank T. McCue, acting chief; and the Construction Division—John L. Haynes, chief.

Later there will be similar consolidations of the units concerned with chemicals, foods, forest products, general products, nonferrous metals, rubber, textiles, leather, etc. The resulting groups will be placed permanently in the Office of Domestic Commerce. This change marks a return to the organizational setup before the war and is also in accordance with recommendations of the Hoover commission for the merging of duplicating and overlapping branches and divisions.

No changes are contemplated in the bureau's Office of Business Economics or in the present regional offices setup.

Europe's Industry Must Do More Research

French, British scientists, industrialists meeting in Paris hit "tariffs on knowledge," tax policies and business timidity which curb development work

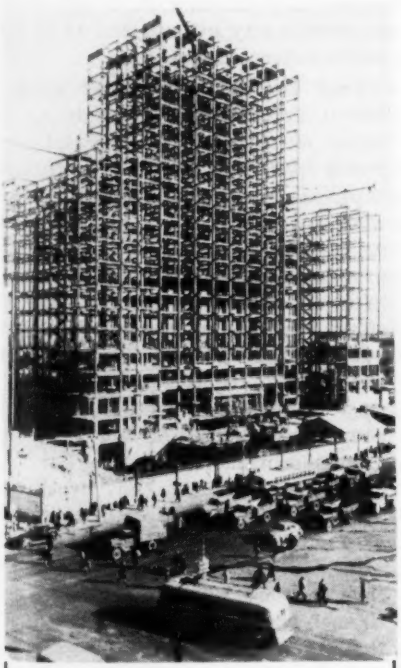
EUROPEAN industry must spend more money, time and effort on research and development.

This is the consensus of industrialists and scientists who attended a joint meeting of the British Institute of Metals and the French Metallurgical Society in Paris. At the convention, speakers urged formation of an international technical society to help in the exchange of scientific information.

Members of the metals groups criticized the "high tariffs on knowledge" fostered by rampant nationalism, tax policies of European nations which discourage research and the timidity of many businessmen who refuse to gamble on product developments.

Economic Commission for Europe seconds these opinions. In a report on housing, it gloomily predicts that Europe will take another 22 years to get adequate dwellings if the prewar rate of construction is maintained as it has been. International exchange of scientific information and collaboration in research work to find better building methods and improved materials are the only answers to the problem. Europe, all told, lost 8 per cent of its building wealth because of the war. At the end of 1947 only 1.6 per cent of the war damage had been repaired.

There are a few bright spots in the dark research picture, speakers at the Paris convention and ECE spokesmen believe. The French iron and steel industry is co-operatively supporting a research organization which has already begun operations. The British construction industry is making strides, particularly in design of aluminum buildings. The Norwegian farm equipment makers are active in product development, will soon introduce a revolutionary type of planter. Even in Western Germany, the gadgeteer—now flooding the market with dozens of household knickknacks—heralds the return of the inventor of more important types of products.



SOVIET SKYSCRAPER: This is the metal frame of the 26-story office building under construction in Moscow's Smolensky Square. It is part of postwar reconstruction. NEA photo

French Labs in Operation

Paris convention delegates visited the major laboratories of France. These include the locomotive testing plant of the French National Railroads at Vitry, another laboratory at Vitry for government-sponsored fundamental research, a facility at Bellevue for product development and a plant for iron and steel research at Saint-Germain near Paris.

This last laboratory was founded in December, 1944, and is financed by the steel industry by means of levies on pig iron and ingot steel. An institute which runs the plant applies scientific research to industrial technical problems and helps individual steel producers with problems beyond their scope. The institute is now mainly concerned with the enrichment of iron ores, heterogeneity of forging ingots and protective coatings for steel products.

Individual companies can still safeguard their own inventions. For Example, Societe d'Electro - Chimie, d'Electro-Metallurgie et des Acieries Electrique d'Ugine controls patents on an extrusion process for steel, blueprints for which have been brought to the U. S. by Graham W. Parker, New York management consultant for Ugine.

The process, invented and patented by Rene Perrin, metallurgist and executive of Ugine, makes it possible to handle steel like a plastic material. The process permits extruding the most intricate forms and sections in a hydraulic press. This eliminates many costly operations of forging and machining. Finished gears of alloy steel can be made in two operations by the Ugine method. Ugine has head offices in Paris, employs 24,000 workers in its alloy steel plants and operates three research laboratories.

U. K. Designs New Building

One of the most spectacular new products with which Britain hopes to lure American sales is an aluminum building featuring roof suspension by steel cables rather than by conventional truss members. The structure is suitable for canteens, exhibitions and shows. It is portable and available in sizes providing from 2646 to 34,200 sq ft of floor space.

The patent office in the United Kingdom is doing a moderate business. New patents having application for jet and conventional engines are the most numerous.

The British now are stressing production methods more than new products as a means to regain their economic feet. Indicative of this is the number of productivity teams which have visited the U. S. The ninth is now in this country studying American methods of generating, transmitting and distributing electric power.

Norway Develops Farm Unit

Norway will begin marketing a new planting machine early in 1950. It can be used for practically any kind of vegetable and feed plants. Distance between plants and rows can be regulated according to needs. The device can undersell any imported product in Norway and is competitive in price with similar American machines on the export market.

Development of farm machinery is only one phase of Norway's reconstruction. Most ambitious is the rehabilitation of Norway's largest iron ore mine at Sorvaranger which was totally destroyed by the Germans. In 1939, the peak year of production, the mine produced 839,000 tons. It is now being rebuilt, will be ready for full output by 1952 and is expected to yield 1 million tons yearly.

Norway's road traffic rose from 5 million vehicle-kilometers in 1920 to 95 million in 1947. The country has 27,500 miles of roads. Railroads have a 2750-mile system, of which about 16 per cent is now electrified. The Norwegian Airlines System has increased its traffic from 1 million passenger-kms in 1935 to 85 million in 1948.

Estimates indicate that the potential power capacity of Norwegian

UNIVERSITY OF MICHIGAN LIBRARIES

waterfalls is more than 100 billion kwhr annually. The developed capacity reached 13.5 billion kwhr in 1946, will reach 16 billion this year. The per capita consumption of electric power in Norway is the highest in the world; 41 per cent of the energy is consumed by electrochemical and electrometallurgical industries; 22 per cent by other industries; 1.5 per cent by the railways; 35 per cent by general users.

German Gadgets Return

The immense popularity in Western Germany of household gadgets —new ones ranging from beer warmers to mechanical hat racks are flooding the market now—indicates that the German inventive flair is coming back, that developments in more important products will be forthcoming.

The nation needs inventive genius for its economy is precarious. Only the automobile industry is still booming. Total production of all cars reached 16,525 units in September, compared with 15,628 in August. Many new plants will soon begin production.

Volkswagen, which is the largest producer, is still publicly controlled. The issue of public ownership in all industry is bobbing up again. The strongest party, the Christian Democrats, is none too powerful at Bonn, may have to make concessions to moderate socialists who are clamoring for modified nationalization, particularly in the coal industry.

Dismantling of the Thyssen steel works is proceeding rapidly. About 25 per cent of the plant has been torn down, including several open-hearth furnaces, rolling mills and auxiliary equipment, a conversion mill, three pig iron furnaces and a power plant.

Coal, Steel Strikes, 40-Hour Week Dim Railroad Buying Prospects

By HOWARD C. TUTTLE
Chicago News & Market Editor

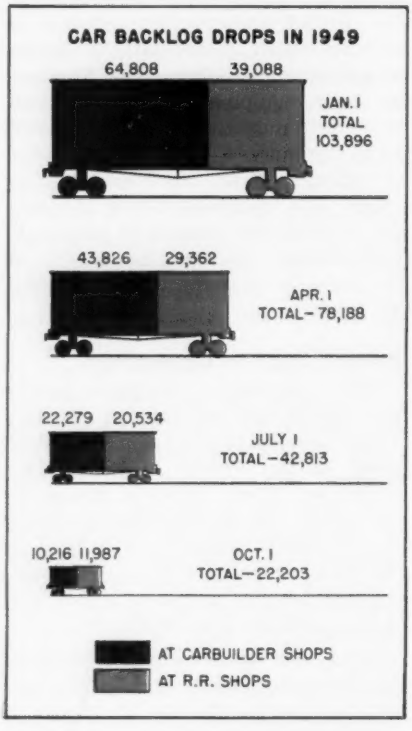
WHAT are railroads planning to do next year? What equipment and materials will they buy? Where will they get them? These are a few of the questions running through the minds of people who supply this great industry.

The questions are more pertinent today than for years past. To at least one important group of metalworking companies—the car and locomotive builders—the answers mean bread and butter. The same applies to the foundries, forge shops and others that live off the business done by car builders.

Many Uncertainties—Railroads normally would know by this time the answers to most of these questions. Their next year's requirements would be pretty well determined; they'd have a good idea of the tonnage and passengers they would be called on to transport; they could closely figure what their expenses would be, how much money they would take in. Right now they don't know these things, and they don't feel they can be very good guessers.

Their problems are many. To name a few: The 40-hour week, inroads on traffic by other modes of transportation, labor's demands, sharp loss of revenue from two of their most important freight commodities —steel and coal. These problems stand like a stalled freight train blocking the view up the right-of-way.

Strikes Hit Traffic—Adoption of the 40-hour work-week is of less immediate concern than the situation arising out of the strikes. George M. Crowson, assistant to the president, Illinois Central, says: "The labor situation in the coal and steel industries has a much greater impact on the revenues of the Illinois Central than the 40-hour week has.



"Disturbances in major industries have an effect on railroad revenues, and our budget for car repairs and the construction or acquisition of new equipment must necessarily be considered in the light of our earnings."

Railroaders Agree—Other railroaders think much the same. C. H. Buford, president, Chicago, Milwaukee, St. Paul & Pacific, says: "National economic conditions will have greater effect on our acquisition of new cars and locomotives than the adoption of the 40-hour work-week." Douglas C. Turnbull Jr., executive assistant, Baltimore & Ohio, states: "Any overall planning that we have done has been knocked in a cocked hat by steel and coal. . . The 40-hour week is important but conditions in the weeks that we have used it are far from normal." E. C. Gegenheimer, acting director of public relations, Pennsylvania Railroad, says that because of the uncertain conditions now existing it is impossible to provide any information as to the road's future purchases.

Lack Experience on Short Week—The Union Pacific, through A. J. Seitz, executive vice president, reports: "We have not had sufficient experience with the 40-hour work-week to determine its effect on our future requirements." A. T. Mercier, president, Southern Pacific, says: "The 40-hour week has not been in effect long enough for us to determine to any definite degree what changes the compressed work-week may bring in connection with our railroad equipment buying when we are again in the market."

The views of J. H. Day, vice president—traffic, New York, Chicago & St. Louis, who says that "the 40-hour week will have a tendency to further decrease railroad purchases until such time as traffic via rails, particularly freight traffic, reverses the present downward trend," are not entirely shared by Walter J. Tuohy, president, Chesapeake & Ohio, William White, president, Delaware, Lackawanna & Western, or Henry Doherty, New York Central.

Sees Little Change—Mr. Tuohy says: "No substantial changes in

FREIGHT CAR DELIVERIES

	Car Builders	Railroad Shops	Total Deliveries
Jan.	6,130	2,783	8,913
Feb.	7,421	2,894	10,315
Mar.	8,958	2,924	11,882
Apr.	8,499	2,088	10,587
May	6,879	2,646	9,525
June	5,805	3,316	9,121
July	3,655	2,779	6,434
Aug.	4,245	2,933	7,178
Sep.	3,936	2,205	6,141

FREIGHT CAR AWARDS

	Car Builders	Railroad Shops	Total Awards
Jan.	1,393	175	1,568
Feb.	332	...	332
Mar.	269	200	469
Apr.	30	...	30
May	589	...	589
June	153	...	153
July	208	200	408
Aug.	185	...	185
Sep.	123	...	123

buying habits are expected to result from adoption of the 40-hour week. Our car repair shops may be used to a limited extent to build new freight cars in order to stabilize employment on a 40-hour per week basis. We do not expect to send freight cars to outside shops for repairs." Mr. White says: "The adoption of the 40-hour week will have nothing to do with our buying habits. We simply have to do as much work in 40 hours as we heretofore did in 48." At the New York Central "the change to the 40-hour week is not expected to make any change in buying habits or types of equipment, which will continue to be made according to requirements of traffic."

Buying Plans Undecided—In light of their uncertainty over the combined effect of the various factors it is not surprising most of these roads either do not now know what they will do over the remainder of this year and in 1950 with respect to new car building or do not expect to buy any additional equipment.

Mr. Buford of the Milwaukee road says: "After completion of our new car construction program late this fall I don't believe we will be in the market for any new freight cars in 1950 unless there is a substantial increase in the volume of traffic."

C & O Buying Light—The C & O plans no substantial purchases of new freight cars in 1949-50. Some 149 passenger cars and 135 diesel-electric switching engines are on order for delivery in this and next year. In development of "modern lightweight, radically different" passenger-carrying equipment "we are progressing actively," Mr. Tuohy reports.

Plans No New Purchases—The Lackawanna "so far as we know now," Mr. White says, "will not purchase any new cars during the remainder of this year or in 1950." But there is a possibility that some cars of a special nature may be ordered. Diesels now handle practically all the road's main line business and with a large number of serviceable steam locomotives stored "it is unlikely any additional locomotives will be ordered before the end of 1950, although it is possible that we might purchase as many as ten 1000-hp diesel yard engines."

The Nickel Plate, states Mr. Day, has no plans for purchase of freight cars or locomotives between now and the end of 1950. The road expects to take delivery of 200 new 50-foot box cars beginning this month.

The Union Pacific's 1950 plans are not yet crystallized but it does not contemplate placing orders for additional rolling stock during the remainder of this year, according to Mr. Seitz.

Modernization Completed—Most of the IC's postwar car repair, building and modernization program has been completed. The passenger train portion of the overall program was finished some time ago. Its ambitious freight car program consisted of the building of 4155 freight cars from 1946 to 1948 and 4975 cars in 1949. By Sept. 30 all these except for 266 50-ton hoppers, being built by a contract shop, 421 50-ton hoppers, abuilding in its own shops, and 375 50-ton flat cars, also from its own shops, had been delivered. These remaining cars, except for 266 flat cars, will be delivered this year. Two 2000-hp diesel transfer locomotives are scheduled for late 1949 delivery and 20 1000-hp diesel switch engines will come through in 1950. The road's 1950 repair and building program is not definitely set at this time, Mr. Crowson adds.

While, according to Mr. Mercier, the Southern Pacific's program for new rolling stock acquisition in 1950 is not completely formulated, on Oct. 1 the following equipment, all scheduled for delivery by July of next year, was on order: 77 diesel locomotives, including 33 6000-hp freight engines, estimated cost $26.8 million; 4047 freight cars, $20.5 million; 139 passenger train cars, $19.3 million.

New Buying Slackens—The pace of new buying has slackened but has not completely stopped in its tracks. Maybe one man hits the spike on the head when he says: "Our problem continues to be a vigorous search for the hiding place of the bottle of black ink." A few inquiries for new equipment have gone out in recent weeks, possibly to get the feel of the cost picture in the coming year. There is a strong belief among some railroad men that they can meet and beat the independents' competition.

Backlogs Dwindle—Statistics compiled by the American Railway Car Institute (see chart table) show several significant developments. Notable is the drastic reduction in number of freight cars on order as of Oct. 1 compared with Jan. 1. Latest figures show the railroads themselves now hold more orders than car builders. Although deliveries of new freight cars from railroad shops show little change from month to month this year, deliveries from the independents were substantially lower in recent months. Bulk of new awards continue to be made to unaffiliated car shops. This is especially true in the case of passenger cars.

CALENDAR OF MEETINGS

Nov. 7-8, Conference on X-ray and Electron Diffraction: Mellon Institute of Industrial Research, Pittsburgh.

Nov. 10, Illinois Manufacturers' Association and Armour Research Foundation: Second annual conference on industrial research, at Technology Center, 35 W. 33rd St., Chicago. Association headquarters are at 120 S. LaSalle St., Chicago.

Nov. 10, American Iron & Steel Institute: Sixth regional technical meeting, at the Mark Hopkins Hotel, San Francisco.

Nov. 10, Purchasing Agents Association of Chicago: Meeting, Hotel Sherman, Chicago. Association headquarters are at 134 N. LaSalle St., Chicago.

Nov. 10-11, American Management Association: Meeting on industrial cost reduction, at Palmer House, Chicago. Association headquarters are at 330 W. 42nd St., New York.

Nov. 10-11, National Foundry Association: 51st annual meeting, Waldorf-Astoria Hotel, New York. Association headquarters are at 120 S. LaSalle St., Chicago.

Nov. 10-11, National Symposium on Air Pollution: Sponsored by Stanford Research Institute in co-operation with California Institute of Technology, University of California and University of Southern Calif., Huntington Hotel, Pasadena, Calif.

Nov. 14-18, Refrigeration Equipment Manufacturers Association: Sixth refrigeration and air conditioning exposition, at Atlantic City Auditorium, Atlantic City, N. J. Association headquarters are at 1346 Connecticut Ave. N. W., Washington.

Nov. 15, American Supply & Machinery Manufacturers' Association and National Supply & Machinery Distributor's Association: Cosponsors of the second industrial distribution forum, Congress Hotel, Chicago. American's headquarters are at 1108 Clark Bldg., Pittsburgh.

Nov. 16-18, Industrial Hygiene Foundation: 14th annual meeting, Mellon Institute, Pittsburgh.

Nov. 17-18, Magnesium Association: Quarterly meeting, New York. Association headquarters are at 30 Rockefeller Plaza, New York.

Nov. 25-26, American Foundrymen's Society: New York regional conference, Syracuse University, Syracuse, N. Y. Society headquarters are at 222 W. Adams St., Chicago.

Nov. 26, American Iron & Steel Institute: Regional technical meeting, Thomas Jefferson Hotel, Birmingham.

Dec. 26-31, American Association for the Advancement of Science: Meeting, New York. Association headquarters are at 1515 Massachusetts Ave., Washington.

Nov. 28—Dec. 3: 22nd Exposition of Chemical Industries: Grand Central Palace, New York.

Nov. 28-Dec. 2, American Society of Mechanical Engineers: 70th annual meeting, Statler Hotel, New York. Society headquarters are at 29 W. 39th St., New York.

Nov. 30-Dec. 2, Society for Experimental Stress Analysis: Annual meeting, Hotel New Yorker, New York. Society postal address is Box 168, Cambridge 39, Mass.

Dec. 1-2, Council of Profit Sharing Industries: Second annual conference, Hotel Roosevelt, New York. Council headquarters are in the First National Tower, Akron.

Dec. 2, American Council of Commercial Laboratories: Meeting, Hotel Statler, Washington. Council headquarters are at 318 Evans Bldg., Washington.

Dec. 6, Material Handling Institute: Annual meeting, Hotel Commodore, New York. Institute headquarters are in the Clark Bldg., Pittsburgh.

Dec. 8-10, American Institute of Mining & Metallurgical Engineers: Seventh annual conference of Electric Furnace Steel Committee. Institute headquarters are at 29 W. 39th St., New York.

UNIVERSITY OF MICHIGAN LIBRARIES

A **BULLARD SPACER** applied to Radial Drills has proved its worth in Savings by eliminating many costly jigs previously required on many drilling operations.

Almost unbelievable operational Savings have also been made.

However, Accuracy is only as good as the accuracy of the Drill to which the Spacer is applied. To assure the Accuracy of which the spacer is capable, Cincinnati Bickford offer their Super Service Precision Drilling Machine.

With a Precision Spindle in the drill, this combination is *Hard to beat* on reproduced Accuracy of hole spacing, drilling, reaming and tapping.

Installations of this type are proving Profitable investments in numerous plants. Ask Bullard or Cincinnati Bickford about this "Natural" combination.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automakers, faced with steadily increasing employment costs, renew efforts to trim production, maintenance, packaging, distribution and purchasing costs

DETROIT

WITH the labor ante being boosted by pensions and insurance, renewed efforts are being made to trim manufacturing costs. Progress in this direction over the past four years has been remarkable and has been one factor in holding motor vehicle price rises to 93 per cent since 1939, while average weekly wages climbed 130 per cent.

While steady improvements in production machinery have resulted in important economies, there has been concurrent attention to nonproductive operations—materials handling, automatic inspection, better plant maintenance and repair practices and improvements in packaging, purchasing methods and parts distribution. In one automobile company there are presently 96 technical committees studying ideas for cost reductions. Any plan that looks promising is tested in one of the company's plants, and if the results are good it is spread immediately to all other plants where applicable.

Leaks Eliminated—Many suggestions are relatively simple. In one plant, for example, a program for reducing leaks in compressed air lines was tested. It involved repacking of air valves and taking out unneeded pipes. When the program showed savings it was put in force at all plants using compressed air and the savings last year alone totaled around $100,000.

Another plant was using permanent containers to ship small parts to various assembly points. A new container was devised, with a wood base and cardboard sides, to hold up to 2 tons of parts. It was sold as scrap after one use, ending repair work on containers and return-shipment costs. In the last year this new container was widely used and has brought savings of well over $1 million.

Increases Tool Life—Still another car manufacturer set up a tool research department after the war. By testing various types of drills, dies and other basic tools, the department has found ways to increase tool life by as much as 800 per cent on some jobs. On one type of tool alone, the company saved $191,000 last year.

One automotive company was able to transfer 1000 men to more productive jobs by installing automatic equipment on 60 major production lines and several hundred smaller lines. The equipment includes "iron hands" to place stock into presses and remove it after forming, automatic oiling and scrap removal systems, and devices to remove metal burrs and to count, stack and load various finished parts. This company has made 54 changes in machine equipment or attachments in the past year and has realized savings ranging from $2000 to $200,000.

Save $71,000 on Gloves—A switch from rubber work gloves which cost $1.14 a pair and lasted only one day, to plastic gloves at 88 cents a pair and lasting three days meant a saving of $71,703 at another plant.

Simplification of parts design also has resulted in appreciable cost savings. One firm which produces over a million vehicles annually saved $1 per vehicle in the last year by using a less complicated ignition switch, and saved 19 cents per vehicle by changing from a two-tone to a single color in steering wheels.

Wage Bill Triples in Decade—Today there are about 800,000 persons working for U. S. automotive companies, or 71 per cent more than in 1939. And with average wages now nearly $70 a week, comparing with $32.91 ten years ago, the industry's total wage bill is more than triple what it was in 1939. Part of the increased employment is due to today's higher production volume, but the average motor vehicle, because of postwar styling and new engineering features, requires substantially more man-hours of labor in its building than did its 1939 counterpart. So, it has been the mobilization of technical and managerial skill to find ways to do the job at lower cost which has made it possible to employ more persons at higher wages, build vehicles with more "labor content" and still keep prices at a level attracting more buyers than ever before.

K-F Tools for Light Car

KAISER-FRAZER has held the first of a series of country-wide dealer meetings at which details of the company's future planning are being re-

FOR HAPPIER MOTORING: Inspecting a General Motors high compression test engine used for research into better motor fuels are George H. Kublin, manager of the Detroit staff of GM Overseas Operations; Col. Charles W. Kerwood, ECA technician; Paul Chatelin, technical administrator, Technical Center of the French Foundry Industry, Paris; R. Donn, chief of the industrial analysis branch, French Embassy in Washington; and A. J. de Seabra, chief interpreter, U.S. State Department

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

UNIVERSITY OF MICHIGAN LIBRARIES

vealed. Detroit dealers were shown pictures of the new low-priced car which the company is tooling to place in production next spring. It will be followed later in the year by two completely redesigned models in the medium-price class. About $22 million of the $34 million loan negotiated by K-F with the RFC will be required for dies, jigs, fixtures and other tooling for the three new series of passenger cars. At the moment, the K-F plant is shut down, apparently for the purpose of clearing out stocks of completed cars. This doubtless is one condition of the RFC loan—that inventories of assembled cars be cleaned up. To do this it was necessary to arrange another $10 million loan to cover wholesale financing operations. Conditions of the latter stipulate it may be used only for wholesale financing of current factory stocks, said to be several thousand.

Plan Name Contest—An intensive campaign of promotion for the new lower-priced model is being shaped up for early release. Among other things it will feature a $200,000 prize contest for best suggestions for a name for the car. Entry blanks will be furnished by K-F dealers, and if the contestant has his old car appraised for trade-in value at the same time he picks up a contest blank, he can win a double prize.

When production is resumed at Willow Run, present models will be continued unchanged, with a switch to 1950 serial numbers being made to differentiate them from 1949 models. The forthcoming small car will be priced below anything now on the market in the low-priced field. It will feature safety and economy of operation, will not be sub-standard dimensionally.

Price More Important—There is little question that price is coming to be a more important factor in the minds of buyers. Sales in the low-priced field are higher this year than last, proportionately, and all producers report their lower-priced models are meeting with increasing favor. The proportion of sixes to eights is climbing, Ford for example now building 22 per cent sixes as against 15 per cent a year ago.

Crisper Designs Coming

SEVERAL hundred were in attendance at the annual meeting of the American Society of Body Engineers here last week. Seventeen technical papers were presented at afternoon and evening sessions, covering such subjects as styling, small cars, use of die castings, control charts in assembly operations, welding methods, self-retaining fasteners, and automobile bodies in Europe.

In an appraisal of passenger car designs, Carl W. Sundberg of Sundberg & Ferar predicted that a trend will develop toward designs that are more crisp and well-defined. He said this has been true in such products as household appliances and business machinery, the buying public welcoming the crisper, slightly more severe shapes as a relief from the so-called streamlined shapes which have been so much in vogue for the last ten years. He added that yearly style changes are one of the greatest evils and pitfalls for the modern designer since they often lead to a "corned-up, overdone type of product in order to make it look different from the preceding year's style."

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,996
June	623,689	454,401
Six mos.	3,134,055	2,617,581
July	604,351	489,736
August	678,092	478,186
September	657,078	437,181
October	605,000*	516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Oct. 15	146,566	123,185
Oct. 22	143,049	123,067
Oct. 29	140,244	116,968
Nov. 5	130,000	118,229

Estimates by Ward's Automotive Reports

Ford Surplus Grows

FORD has filed its annual report with the Massachusetts state tax commissioner, disclosing an increase in surplus of better than $77 million for 1948. Total assets as of last December stood at $1,149,240,000, with real estate, machinery, equipment, tools and fixtures totaling $430,570,000.

Two new plant projects are being shaped up for early operation by Ford. One is a large die casting operation which will be centered at Monroe, Mich., in a plant recently purchased from Kelsey-Hayes Wheel Co., the other is an automatic transmission project which will be located at Cincinnati. The latter is scheduled for production by spring and the company is understood to have acquired a plant in the Cincinnati area, full details not having been released as yet. Ford will build half its automatic transmissions, Borg-Warner at Muncie, Ind., the balance. A large list of machinery and tooling for the project is now up for quotations by equipment builders, deliveries being specified for next March.

Another Good Quarter

GENERAL MOTORS sales, net income, production and payrolls continued at record high levels during the third quarter, sales totaling over $1.5 billion to bring volume for the first nine months to $4,458,079,585. Net income for the quarter was equivalent to $4.45 per share on common stock, bringing earnings for nine months to $11.21 per share. Using all the new and improved facilities placed in operation since the war, GM plants were operated at capacity levels from April through September. Employment for the third quarter averaged 405,786, a new peacetime high. Payrolls were $376 million.

Nash Schedules Suspension

NASH has announced it will be forced to suspend car assembly at its two main plants in Wisconsin by about Nov. 18 as a result of the coal and steel strikes, although resumption of steel output could make it possible to revise this planning. However, it is doubtful if shipments could be in sufficient volume to avoid some slowing of assemblies. The Nash plant at El Segundo, Calif., has sufficient inventory to continue operations until the first week of December. About 12,000 will be idled in Wisconsin.

Packard Sales Up

PACKARD has reported consolidated net income of $9,111,568 for the first nine months of the year, equivalent to 61 cents per share on common stock. In the same period a year ago, income was equivalent to 63 cents a share. Net sales for nine months this year, however, were up from a year ago, aggregating $187,197,673. Car shipments totaled 89,653. Early last month, the company trimmed its assembly schedules from 92 to 45 cars per hour with the idea of projecting existing materials and supplies over the longest period of time. It is expected the current level of assemblies can be continued through this month.

On its Way WITH NO DELAY

At **COPPERWELD**, the shipping department plays a very important part in customer satisfaction. Whether it is a carload of billets or a one pound sample, there is no "bottleneck" in the shipping department. And just as important as "speed" is "checking". Not one single pound of Aristoloy Steel is shipped until our metallurgical department has authorized its release. This release is assurance that it meets all the chemical and physical requirements of the customers' specifications.

You'll buy no finer steel anywhere, and you'll get it faster from Copperweld.

ARISTOLOY STEELS *Hit the Mark . . .*

ARISTOLOY STEELS

Upper photo shows each bar being measured and recorded. This information is sent along with shipment. Lower—Loading billets in gondola car. Special blocking keeps steel in place enroute and makes for easy unloading.

QUALITY CARBON
STANDARD STRUCTURAL ALLOY
BEARING QUALITY
ALLOY TOOL
STAINLESS
SPECIALTY
NITRALLOY
CARBON TOOL
MAGNAFLUX - AIRCRAFT QUALITY

COPPERWELD STEEL COMPANY WARREN, OHIO

1578 Union Commerce Building, Cleveland, Ohio
403 W. Eighth Street, Los Angeles 14, California
Monadnock Building, San Francisco 5, California
7251 General Motors Building, Detroit, Michigan
P. O. Box 1633, Tulsa, Oklahoma
117 Liberty Street, New York, New York
176 W. Adams Street, Chicago, Illinois
529 Fisher Building, Detroit, Michigan
3104 Smith Tower, Seattle, Washington

UNIVERSITY OF MICHIGAN LIBRARIES

Acquisition Planned

Standard Spring Steel will buy Falls Spring & Wire if stockholders approve

DIRECTORS of Standard Steel Spring Co. Coraopolis, Pa., and Falls Spring & Wire Co., Detroit, plan to have Standard acquire all assets of the Detroit company.

Willard F. Rockwell, chairman of Standard, says the plan will be submitted to stockholders of both companies for approval. If Standard takes over Falls, Harry Fante, chairman, Harry Swanson, president, and John P. O'Hara, director, of Falls Spring & Wire would be added to the board of Standard Steel Spring. The Falls plants would continue to be operated by the present management. Mr. Rockwell did not reveal any other details of the acquisition plan.

Falls Spring & Wire was incorporated by the late William A. Falls and his associates in 1935. It has two plants in Detroit, one in Chelsea, Mich., one in Chicago and one in Kansas City, Mo. The company supplies part of the requirements of cushion seat springs and back springs to auto manufacturers. It is one of the biggest producers of cushion springs, mechanical springs and tubular products for the automotive industry.

Total area of the Falls plants is about 900,000 sq ft. Company employs about 3500. Its sales for the first ten months of the year are reported to have been approximately $21.5 million.

Rheem Plant Gets New Owner

A ST. LOUIS iron and pipe dealer purchased the Birmingham plant of Rheem Mfg. Co. at public auction for $150,000. Buyer is Louis Greenspon.

The Rheem properties include two large one-story buildings on 14 acres of land, plus several smaller buildings. The company, which manufactured shell casings during the war, later went into production of tanks, attic fans, and space heaters, but several months ago abandoned its Birmingham operations.

New Bethlehem Pacific Plant

BETHLEHEM Pacific Coast Steel Corp. soon will start construction of its new structural steel fabricating plant in Seattle. Completion is planned by May 1, 1950.

The project will include a new structural shop equipped with forming, punching and shearing facilities to handle a wide range of steel frame structures. The shop layout will be designed for straight-line flow of fabrication from receiving to shipping end.

New plant facilities also will include a transmission tower fabricating shop and a complete galvanizing plant.

GE Doubles Plant Capacity

GENERAL ELECTRIC Co. completed a $2 million expansion of its transformer manufacturing plant in Oakland, Calif., making it the largest operation of its kind in the West.

Production capacity has been doubled by the expansion. The plant now produces transformers 1.5 kva to 1000 kva. Most raw materials used in the manufacture are purchased in the western states. The Oakland plant employs about 400 persons and will employ an additional 100 at capacity operations.

Anode Business Expanded

FEDERATED Metals Division of American Smelting & Refining Co., New York, acquired production facilities of Metallurgical Products Co., Philadelphia.

Federated will expand its business in electrical anodes through the addition and will merchandise anodes of all types through 24 sales offices across the country. E. L. Newhouse Jr., American's vice president, is in charge of the Federated division.

Production will be concentrated at the division's Perth Amboy, N. J., plant under R. D. Taylor. There, specialized equipment provides for the efficient manufacture of various types of anodes. Federated's technical staff will be helped by I. W. Wilenchik of Metallurgical Products. The alloys and special products business of that company will be conducted by Mr. Wilenchik from his company's Philadelphia plant, as in the past.

MAJOR PROJECT: Eight wrought iron conduits assembled into a unit of 8-in. centers were placed by derrick barge on sand bags 5 ft under the creek bed in a 2 ft clearance between old bridge piers and new cofferdams for the new Unionport bridge in the salty water of Westchester creek, New York. Conduits were fabricated by A. M. Byers Co., Pittsburgh

United Buys Lobdell

LOBDELL United Co., Wilmington, Del., this month takes over the manufacture of paper mill machinery, calendar stocks, paper and steel mill roller grinders and Nazel forging hammers.

Assets of Lobdell Co.—plant, land, buildings and equipment comprising the machine shop of Lobdell—are being acquired by United Engineering & Foundry Co., Pittsburgh, of which Lobdell United is a wholly owned subsidiary.

K. C. Gardner, president of United, is to be chairman of the board of the new company. G. G. Beard, vice president of United, becomes president of Lobdell United.

It is the eighth company owned outright by United Engineering & Foundry.

Cone-Drive Buys Parsons Plant

MICHIGAN Tool Co.'s Cone-Drive Gears Division bought the Traverse City, Mich., plant of Parsons Corp. The 40,000-sq ft building was built during the war.

Cone-Drive Gears officials say alterations to the plant will begin shortly in the hope that operations can begin early next year. About 100 will be employed in the plant. Cone-Drive makes a special type of gear called "Cone-Drive" and produces speed reducers using that type of gear. In wartime the gears were used in battleships, tanks and airplanes.

Gulf Completes Expansion

TWO Ohio refineries of Gulf Refining Co.—at Toledo and Cincinnati—are in full operation now that an 18-month, $35 million expansion program is finished.

Sixteen new refining structures, buildings and plant extensions were erected at each refinery. Additional tankage increases storage capacity to 50 million gallons.

Briefs . . . .

Paragraphs on developments of interest and significance within the metalworking industry

Lyon Conklin & Co. Inc., Baltimore, sheet metal distributor and fabricator of down spouts and gutters, roll roofing and stove and furnace pipe, is taking over and equipping about 10,000 sq ft of space formerly occupied by McNamara & Co. Inc., steel plate constructor, which is moving into a building of its own.

—o—

International Steel Co., Evansville, Ill., which formed a railway division earlier this year, completed fabrication and installation of 2000 stainless steel refrigerator car interiors for Armour & Co., Chicago.

—o—

Roberts-Gordon Appliance Corp., Buffalo, purchased the idle Buffalo Fire Appliance Corp. plant and will expand its production in the new location. Purchase price was about $150,000.

—o—

Link Aviation Inc., Binghamton, N. Y., received two orders from the Navy for operational flight trainers. Company will hire about 100 more workers to handle the contracts.

—o—

William S. Clark, Baltimore, changed the name of his machine shop from his own name to that of Clark Machine & Welding Co.

—o—

Kropp Forge Co., Chicago, purchased the entire capital stock of A. C. Woods & Co., Rockford, Ill., fabricator of steel. Roy A. Kropp, president, said the deal was for about $500,000.

—o—

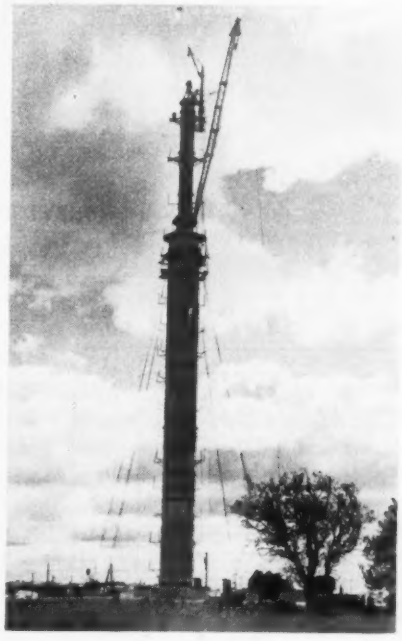
By-Product Coke Co. of Canada Ltd., subsidiary of Koppers Co. Inc., Pittsburgh, is planning construction and operation of an industrial protective coatings plant of 25,000-ton annual capacity at Port Arthur, Ont. Coal tar base coatings produced at the plant—to be in operation in about three months—will be applied to pipe lines transporting oil and natural gas from the Alberta oil fields.

—o—

Bridgeport Brass Co.'s new Rumidor Division was set up as a new consumer division. It will be headed by Joseph C. Bender, a chemical engineer who invented a process which solidifies the rum used in the Rumidor humidor. General offices are in Bridgeport, Conn.

—o—

Yale & Towne Mfg. Co., New York, established a regional branch in Chicago to help bring its Philadelphia factory a thousand miles closer to midwest users of mechanized handling equipment. The branch will handle sales, repair, maintenance and spare parts service for hoists, scales and industrial trucks. Company inaugurated regional demonstrations of attachments to permit standard materials handling machinery to be adapted to swift handling of materials in bags, boxes, barrels or bulk.



DALLAS "ROCKET": What looked to be a rocket to motorists on the outskirts of Dallas turned out to be one of the legs for a huge water tower to be used in a housing development. NEA photo

—o—

Atlas Trading Co., Chicago, steel distributor, opened a branch in Florida. Headquarters are at Ft. Lauderdale. Perc H. Weiner is in charge.

—o—

American scientists lead the world in applications of technical knowledge. So thinks Dr. Robert H. Krieble of the General Electric Research Laboratory. He made the statement after returning from Europe where he inspected various technical and scientific activities with his colleagues, Victor H. Fraenckel and Lyall Zickrick.

—o—

Porcelain Enamel Institute, Washington, reports nine manufacturers of finished metal products have adopted the official Safe Transit label signifying their packaged goods passed the preshipment test standards prescribed by the PEI-sponsored National Safe Transit Committee. Companies authorized to use the Safe Transit label are: A. J. Lindemann & Hoverson Co., American Stove Co., General Electric Co. (Erie), Geo. D. Roper Corp., Malleable Iron Range Co., Norge Division of Borg-Warner Corp., Refrigeration Division of Philco Corp., Tappan Stove Co. and Westinghouse Electric Corp. (Mansfield, O., and Springfield, Mass.).

—o—

Non-Ferrous Perma Mold Inc., a new company jointly owned by Barnes Mfg. Co., Mansfield, O., and Non-Ferrous Die Casting Co. Ltd., London, England, has been incorporated under the laws of Ohio. Factories are in Mansfield.

—o—

Larkin Lectro Products Corp., New York, relocated its entire facilities to a larger plant in Pine Bluff, Ark. From there delivery of arc and resistance welding equipment and power distribution transformers will be scheduled the first of December.

—o—

Platecoil Division of Kold-Hold Mfg. Co., Lansing, Mich., added four representatives: Henry P. Thompson Co., Cincinnati; Power Plant Efficiency Co., Indianapolis; Patton Equipment Co., St. Louis; and W. P. Nevins Co., Chicago. New agencies will help manufacturers work out industrial heating problems.

—o—

Gould Storage Battery Corp., Trenton, N. J., has combined facilities of its sales, service and warehouse under one roof in San Francisco. The new office will head the Gould western region. C. H. Hart, a specialist in battery applications in materials handling and mine haulage, will be western manager.

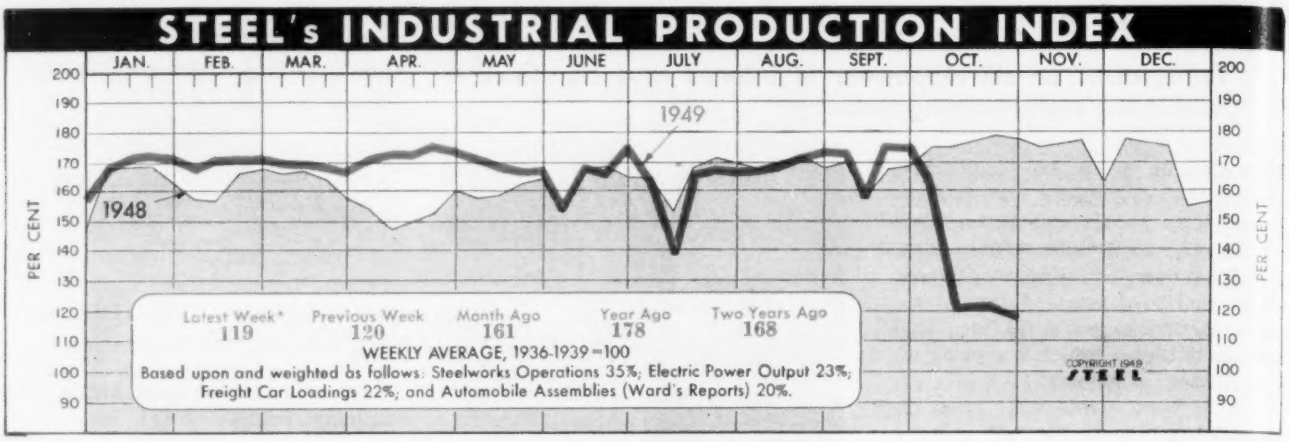
—o—

Soldering Specialties, Summit, N. J., manufacturer of solder and brazing alloys for industrial use appointed these regional representatives: Harry Gerber of Gerber Sales Co. in Boston for the New England area; Harry C. Stockfleth of Chatham, N. J., for metropolitan New York; Harold F. Anderson of Detroit for Michigan; and Arthur J. Ellis of Arthur J. Ellis Co., Chicago, for Illinois, Indiana, Wisconsin and Iowa.

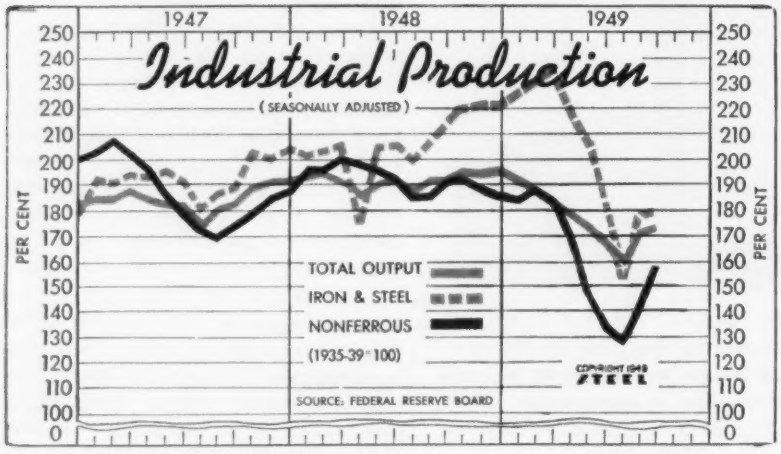
—o—

Graver Water Conditioning Co., New York, manufacturer of equipment for water treatment and liquid conditioning processes, established new sales and engineering offices in Cleveland and Philadelphia. Herman Ross heads the Cleveland office, Robert Schenker, the Philadelphia office.

UNIVERSITY OF MICHIGAN LIBRARIES

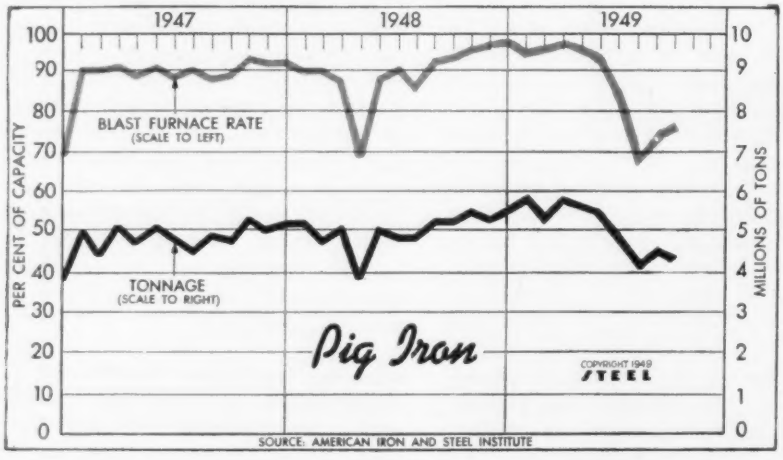

STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1948
1949
Latest Week* 119
Previous Week 120
Month Ago 161
Year Ago 178
Two Years Ago 168
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1949 STEEL

* Week ended Oct. 29 (preliminary).



Federal Reserve Board's Production Indexes (1935-1939=100)

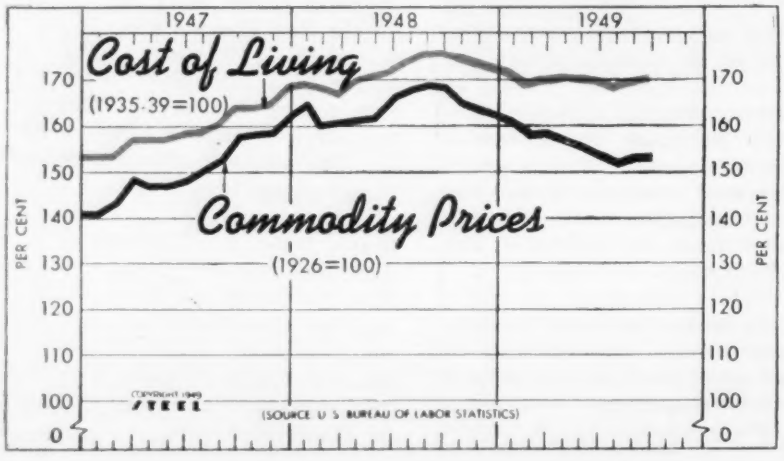
	Total Production		Iron, Steel		Nonferrous	
	1949	1948	1949	1948	1949	1948
Jan.	191	193	228	203	184	197
Feb.	189	194	232	203	186	197
Mar.	184	192	233	207	183	200
Apr.	179	188	219	177	168	198
May	174	191	204	206	145	196
June	169	192	177	208	132	194
July	162	186	156	201	128	185
Aug.	170	191	178	207	141	186
Sept.	172	191	179	214	156	192
Oct.	...	195	...	221	...	192
Nov.	...	195	...	223	...	187
Dec.	...	192	...	222	...	185
Ave.	...	192	...	208	...	193



Pig Iron*

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	1947
Jan.	5,725	5,194	5,071	95.5	90.9	90.8
Feb.	5,223	4,838	4,550	96.5	90.6	90.3
Mar.	5,820	5,020	5,123	97.1	87.8	91.8
Apr.	5,531	3,840	4,830	95.3	69.4	89.3
May	5,517	5,077	5,081	92.0	88.8	91.0
June	4,819	4,990	4,810	83.0	90.2	89.0
July	4,173	4,900	4,585	69.8	85.9	90.3
Aug.	4,477	5,255	4,916	74.7	92.0	88.1
Sept.	4,351	5,208	4,801	75.1	94.3	89.0
Oct.		5,520	5,228	...	96.6	93.6
Nov.		5,399	5,015	...	97.6	92.8
Dec.		5,595	5,177	...	98.1	92.9
Total		60,849	59,210	Ave. ...	90.2	90.1

* Includes ferromanganese and spiegeleisen.



Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-1939=100)		
	1949	1948	1947	1949	1948	1947
Jan.	160.5	165.7	141.5	170.9	168.8	153.3
Feb.	158.1	160.8	144.5	169.0	167.5	153.2
Mar.	158.4	161.4	149.5	169.5	166.9	156.3
Apr.	156.9	162.7	147.7	169.7	169.3	156.2
May	155.7	164.2	147.1	169.2	170.5	156.0
June	154.4	166.4	148.0	169.6	171.7	157.1
July	153.4	168.7	150.8	168.5	173.7	158.4
Aug.	153.0	169.5	153.7	168.8	174.5	160.3
Sept.	153.7	168.7	157.4	169.6	174.5	163.8
Oct.		165.2	158.5	....	173.6	163.8
Nov.		164.0	159.6	....	172.2	164.9
Dec.		162.3	163.2	....	171.4	167.0
Ave.		164.9	151.8	....	171.2	159.2

The Business Trend

FURTHER paring of automobile output in the week ended Oct. 29 caused STEEL's industrial production index to drop another point to 119 per cent (preliminary) of the 1936-1939 average from 120 in the preceding week. The current position of STEEL's index is at the lowest point since June, 1946, and 54 points lower than in the last prestrike week.

AUTOMOBILES—Assemblies of passenger cars and trucks declined 2800 units in the week ended Oct. 29 to 140,244 from 143,049 in the preceding week. It was the sixth consecutive weekly decline from the preceding week's total. A sharper decline is in order for the current week as trimmed schedules are forced upon almost the entire industry by shortages of critical steel items. Even with the steel strike's end in sight further shutdowns are expected before inventories are put back in shape for full scale production. The extent and duration of these shutdowns will depend on how soon steel mills will be able to start shipping their products. Scarcity of certain items, particularly wide sheets, is expected to restrict output beyond the first of next year.

COAL—Bituminous coal production remained low in the week ended Oct. 22, output being only 2.5 million tons, about 10 million tons less than in the same week in 1948. Most of the nation's mines were idle because of the United Mine Workers' strike. Only mines operating are those employing Progressive Miners and UMW-operated mines west of the Mississippi.

PRICES—The consumers' price index of the Bureau of Labor Statistics advanced to 169.6 per cent of the 1935-1939 average in the month ended Sept. 15 from 168.8 a month earlier. On Sept. 15, 1948, the index was 174.5.

PRODUCTION — Federal Reserve Board's seasonally adjusted industrial production index continued its rise in September to 172 per cent of the 1935-1939 average. Gains were effected in manufacturing industries but output of minerals declined about 8 per cent during the month. The board predicts October's index will decline about 20 points because of the steel strike. In September, 1948, the index was 192.

BUSINESS—Stock company formations during September numbered 6867, representing only a slight change from August's 6828. Business failures dropped 10 per cent in September to 732 from 810 in August. Despite this decrease, casualties were 84 per cent heavier than in September, 1948. Liabilities in September fell to $20.6 million, lowest total since January and slightly below September of last year.

RAILROADS—New locomotives installed by Class 1 railroads in the first three-quarters of 1949 total 1430. Locomotive installations in this period were greater than in any corresponding period since 1923. Association of American Railroads totals show 1381 diesels and 49 steam locomotives installed. In the same 1948 period, 952 diesel, 56 steam and 4 electric locomotives were installed. Class 1 railroads also had 775 diesel, 21 steam and 4 electric locomotives on order on Oct. 1.

BAROMETERS of BUSINESS

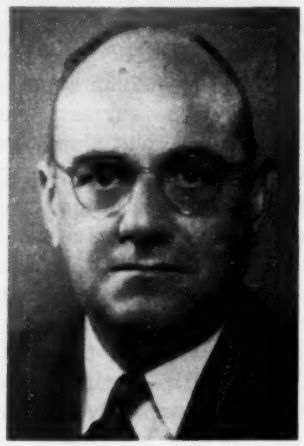
		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	9.0	9.5	70.0	99.0
	Electric Power Distributed (million kilowatt hours)	5,433	5,430	5,521	5,555
	Bituminous Coal Production (daily av.—1000 tons)	423	398	337	2,088
	Petroleum Production (daily av.—1000 bbl)	5,075	5,072	4,950	5,652
	Construction Volume (ENR—Unit $1,000,000)	$135.8	$121.5	$163.9	$179.1
	Automobile and Truck Output (Ward's—number units)	140,244	143,049	151,593	116,968
	*Dates on request. †1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	580†	589	658	932
	Business Failures (Dun & Bradstreet, number)	221	181	181	104
	Money in Circulation (in millions of dollars)‡	$27,328	$27,427	$27,348	$28,091
	Department Store Sales (changes from like wk. a yr. ago)‡	−14%	−12%	−8%	+12%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$13,025	$15,216	$13,071	$14,343
	Federal Gross Debt (billions)	$256.6	$256.6	$256.6	$252.3
	Bond Volume, NYSE (millions)	$17.2	$15.9	$13.6	$21.3
	Stocks Sales, NYSE (thousands of shares)	7,706	6,628	6,179	5,395
	Loans and Investments (billions)†	$66.4	$66.2	$66.5	$62.3
	United States Gov't. Obligations Held (millions)†	$37,625	$37,300	$37,874	$33,416
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	152.52	152.52	152.52	151.86
	STEEL's Nonferrous Metal Composite‡	168.9	169.1	175.9	222.3
	All Commodities†	152.5	152.1	152.4	164.8
	Metals and Metal Products†	169.0	169.2	169.2	170.3
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

UNIVERSITY OF MICHIGAN LIBRARIES

Men of Industry

CHARLES L. HUSTON JR.

ROBERT W. WOLCOTT



WILLIAM M. COWLES

Charles L. Huston Jr., vice president and executive assistant to the president, **Lukens Steel Co.,** Coatesville, Pa., has been elected president, succeeding **Robert W. Wolcott,** president since 1925, who was named chairman of the board. Mr. Huston became associated with Lukens in 1939 after ten years with Armco Steel Corp., Middletown, O. He became vice president in 1948.

—o—

E. Neil Crosier has been appointed secretary and treasurer, **Sharon Steel Corp.,** Sharon, Pa. He will be in charge of all financial matters of the corporation and all subsidiaries. Mr. Crosier has been with Price, Waterhouse & Co. for approximately 20 years, and was a senior manager in the Pittsburgh office. He succeeds **A. J. Watson,** who has reached retirement age but who will continue with the company as assistant secretary. Mr. Watson joined the Sharon organization as secretary and treasurer of Youngstown Pressed Steel, former subsidiary, and transferred to Sharon in 1935.

—o—

Wiley G. Robinett has been elected assistant comptroller, **Gulf Oil Corp.,** subsidiary, Gulf Refining Co., Pittsburgh. **Adam P. Yung** has been elected manager of sales accounting, and **E. F. Franz** as budget director. All three men will report to **W. L. Naylor,** comptroller. **John A. Ellen,** who held the assistant comptroller post since 1933, is retiring. He has served the firm, primarily in accounting and auditing capacities, for the last 40 years.

—o—

George R. Lundberg has been appointed director of advertising and sales promotion by **Osborn Mfg. Co.,** Cleveland. He has been with Osborn 17 years, and for the last two years has been chief accountant.

—o—

N. L. Watkins has been appointed chief development engineer of the Almco Division of **Queen Stove Works Inc.,** Albert Lea, Minn. Prior to association with the division he was with with Westinghouse Electric Corp. for five years as manufacturing engineer at Pittsburgh, and had formerly been associated for six years with Remington Rand Corp., Elmira, N. Y. In addition to his duties at the home office, he will provide technical field service to users of Almco Supersheen deburring and finishing equipment.

—o—

Arthur Smith Jr. has been appointed director of public relations, **Dow Chemical Co.,** Midland, Mich. All public relations activities of the company's several divisions and subsidiaries, including the former editorial service department, will be integrated under Mr. Smith's direction. **L. W. Woodman,** former director of editorial service, will directly supervise institutional publications and releases, while **Eugene E. Perrin** will supervise product promotion.

—o—

J. R. Rose has been appointed sales manager of the western district for **Townsend Co.,** New Brighton, Pa. He will have headquarters in Chicago to co-ordinate company activities of both industrial and jobber sales of rivets, bolts, nails, special metal fasteners and other products in Illinois, Iowa, Missouri, Kentucky, western Ohio, Indiana, Michigan (upper peninsula), Nebraska, Wisconsin, North and South Dakota.

William M. Cowles has been elected sales vice president, **Superior Steel Corp.,** Pittsburgh. He has been general sales manager of the company since 1941.

—o—

Eugene C. O'Connell and **Clarence H. Gabriel** have been appointed managers of the San Francisco and Denver sales and service branches, respectively, for **Independent Pneumatic Tool Co.,** Aurora, Ill. Mr. O'Connell formerly served as service engineer in the Los Angeles branch, and Mr. Gabriel was service engineer in the company's Salt Lake City, Utah, branch.

—o—

Harold Meyer has been placed in charge of a new district office opened in Tulsa, Okla., by **De Laval Steam Turbine Co.,** Trenton, N. J. Mr. Meyer has been handling the sale of De Laval pumps, turbines, blowers and gears for over six years.

—o—

Gerlinger Carrier Co., Dallas, Oreg., has appointed **George C. Lichty** as assistant sales manager. He has been associated with the firm in recent years as a factory representative.

—o—

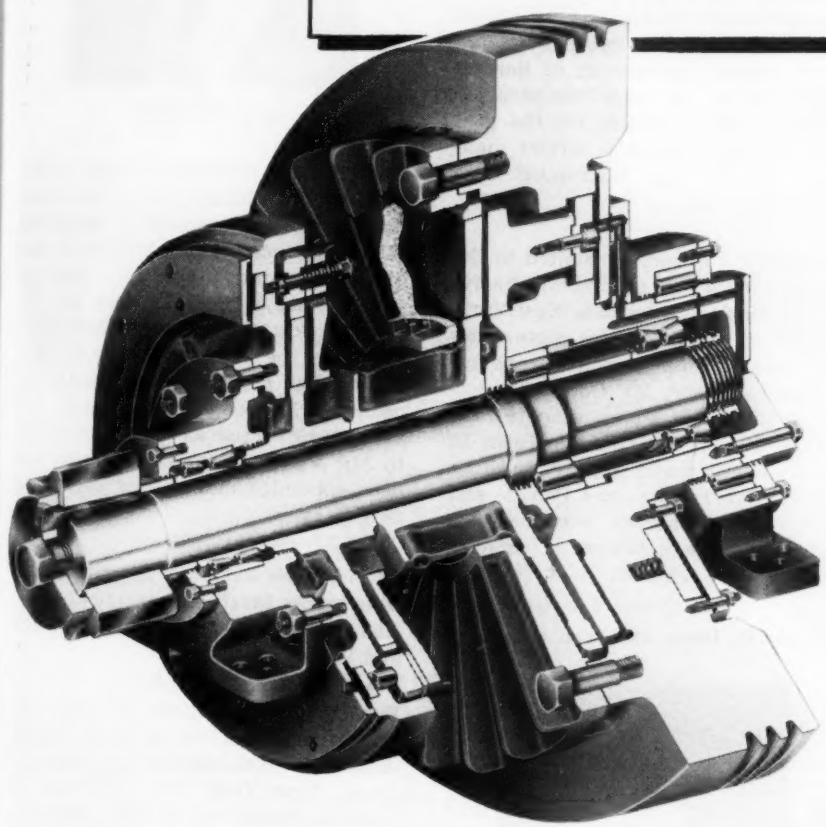
A. F. Holden Co., New Haven, Conn., and Detroit, announces appointment of **Lloyd J. Bohan** as West Coast representative. He has been associated with the metalworking industries for 14 years, the last two as a manufacturer's agent in southern California, specializing in heat treating equipment.

—o—

Cecil R. Pond has been appointed sales representative in Birmingham for **Automatic Transportation Co.,** Chicago, manufacturer of materials

For Greatly Improved Press Performance Greatly Reduced Maintenance Time—

the new CLEARING tornadyne TRADE MARK clutch and brake unit



Because press performance—and maintenance requirements—are so largely dependent upon the clutch, this newest Clearing development has an important dollars-and-cents significance for every press user.

By reducing the number and weight of the parts which stop and start, Clearing engineers have created a clutch and brake unit which eliminates approximately half of the energy loss common to presses equipped with conventional clutches. That means only half as much heat is developed, so the clutch runs cooler and the power bill is smaller.

Complete elimination of packing and rubbing seals has reduced maintenance needs very materially. Changing friction linings requires no crane or hoist—the whole operation takes well under an hour.

A Clearing press has always been a highly profitable investment from a cost-reducing standpoint. With the new *tornadyne* clutch and brake unit as standard equipment, Clearing presses become still more profitable as production machines.

CLEARING MACHINE CORPORATION
6499 West 65th Street • Chicago 38, Illinois

PRINCIPAL FEATURES OF THE new CLEARING tornadyne clutch and brake unit

- ★ Minimum inertia loss due to small mass of parts that start and stop with each cycle.
- ★ No air cylinder packing. A nylon diaphragm with ¼" travel does the work.
- ★ All-metal labyrinth seals, with no wearing parts, replace leather or composition packings for retaining lubricant.
- ★ All drive shaft bearings, including flywheel, lubricated by automatic system or from floor level.
- ★ Friction inserts easily replaced without disassembly of parts from the press and without need for crane or hoist.

—and many other features.

SEND FOR DETAILS

The complete story of the Clearing *tornadyne* Clutch, with all its features described and illustrated, is available in a new bulletin. A copy will be sent free at your request.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

UNIVERSITY OF MICHIGAN LIBRARIES

handling equipment. His territory includes Alabama and the northwestern part of Florida.

—o—

Robert A. Speck and **George R. Milne** have been appointed vice presidents of **National Carbide Corp.,** New York. Mr. Speck will be in charge of sales and distribution, and Mr. Milne in charge of operations. Mr. Milne will continue to have headquarters in Louisville in order to remain close to company manufacturing operations. **Russell T. Lund** has been appointed operating manager, responsible for operating practice, procedure and methods at all plants. He will report to Mr. Milne, and will remain at Louisville. **Astor Brown** has been named acting works manager at Ivanhoe, Va., and **Clarence G. Burnham,** controller. **George R. Fuller** continues as general sales manager. **W. P. Metcalf** has been appointed purchasing agent, and **R. J. Niebanck** becomes technical assistant to **J. Carl Bode,** president.

—o—

James C. Sinnigen, management and public relations consultant and industrial executive for 25 years, has joined **Pendray & Leibert,** public relations firm, New York. He will specialize in public relations counseling and projects for industrial concerns and business organizations. From 1943 to 1945 he was chief management engineer and executive assistant to Republic Aviation Corp.'s vice president-general manager, and was previously production manager and assistant to the general manager of Fairchild Airplane & Engine Corp.

—o—

G. K. Iwashita has been appointed

G. K. IWASHITA

manager of product planning, air conditioning department, **General Electric Co.,** at Bloomfield, N. J. He previously was manager of product research, Seeger Sunbeam Corp., Evansville, Ind. He served in various engineering and product planning positions with manufacturing companies since 1928, and now holds 23 patents covering air conditioning and refrigeration machines.

—o—

L. R. Kerns has severed connections with **L. R. Kerns Co.,** Chicago, and his interest has been purchased by a group of employees who will retain the name of the company. New officers are: **B. L. Smalley,** president; **S. F. Gordon,** vice president; **D. E. Fredericks,** vice president; and **M. H. Schellenberg,** secretary-treasurer.

—o—

Erling G. Fossum, associated with Stewart-Warner Corp., Chicago, since 1926, has been appointed general manager of **Stewart-Warner Electric,** the company's radio and television division. He fills the vacancy created by the recent resignation of **Samuel Insull Jr.** Mr. Fossum has been assistant to the president for the past year, and was formerly service manager of Alemite, instrument and heater divisions.

—o—

W. J. Corr has been appointed to the newly created post of director of service for **Mack Trucks Inc.,** New York. Combining former service engineering and general service departments under his command, Mr. Corr will oversee all parts and service activities for trucks, busses and fire apparatus in Mack's eight major selling divisions in the United States and Canada and its 67 direct factory branches. He will have headquarters at Mack's Plainfield, N. J., plant.

—o—

Francis B. Dunn has been appointed

FRANCIS B. DUNN

manager of the Houston Works of **A. O. Smith Corp.,** Milwaukee. **C. W. Wheatley,** who had been assigned temporarily to building up the postwar management of the Houston Works, has returned to Milwaukee where he will resume work on the general staff, handling problems associated with materials requirements of the company.

—o—

Jack Victorine has been appointed

JACK VICTORINE

general sales manager, **Cooper Alloy Foundry Co.,** Hillside, N. J., and **Morton C. Meyers** appointed assistant sales manager. Mr. Victorine has been connected with the stainless casting field at Cooper Alloy for the last 17 years, and has been sales manager for the last eight years. Mr. Meyers has been associated with the company for the last 12 years, and since 1945 served as direct assistant to Mr. Victorine. **J. L. Lessman** has been appointed manager of valve and fitting sales.

—o—

F. P. Rogers has been appointed representative for the Butterfield Division, **Union Twist Drill Co.,** in Oregon and Washington.

—o—

Paul Linz has been named chairman of the board of directors of **South American Minerals & Merchandise Corp.,** New York. He continues as personal assistant to Dr. Mauricio Hochschild in all his enterprises. "Samincorp" represents the Hochschild interests in Peru, Bolivia, Chile, Argentina and Brazil as importers of ores and concentrates and exporters of metals, machinery, steel products, chemicals and pharmaceuticals.

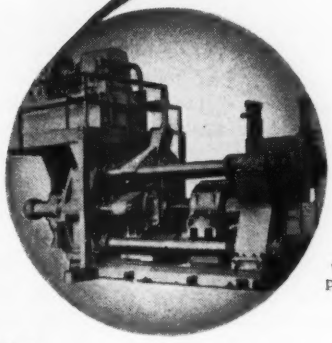
—o—

Wesley L. Dinsmore and **William L. Donaldson** have been appointed district managers of **Chicago Vitreous Enamel Product Co.,** Cicero, Ill. Mr. Dinsmore will be in charge of the New England territory, and Mr. Donaldson of the east central states.

—o—

A. C. Cronkrite, vice president, central region sales, Chicago, **Universal**

ever wonder why...



Lombard 4-column hydraulic extrusion press

so many successful companies go OUTSIDE to solve INSIDE production problems...

That's a fair question that any thoughtful management group might ask. Their company has competent engineering talent, production brains, design skill. Yet... there are times when the obvious production answer eludes them. Why?

Maybe they are too close to their own problem. Maybe they aren't set up to conduct thorough research based on similar production experiences. Maybe it's a question of not enough hours in a day.

LOMBARD PACKAGED ENGINEERING represents the combined skills of industrial researchers, mechanical designers, production engineers, machine builders, field engineers whose record of experience cuts across all industry. This coordinated team is ready to consider your problem now. Whether it's a single machine you need or a complete manufacturing plant, Lombard *Packaged Engineering* is the modern answer to your production problem.

RESEARCH AND DESIGN

ENGINEERING AND MACHINE CONSTRUCTION

FIELD SERVICE

INVESTIGATE LOMBARD *PACKAGED ENGINEERING* TODAY!

LOMBARD CORPORATION
ENGINEERS AND DESIGNERS
EMPIRE BUILDING • YOUNGSTOWN 3, OHIO

EQUIPMENT MANUFACTURED BY UNITED ENGINEERING AND FOUNDRY CO., PITTSBURGH, PA.

UNIVERSITY OF MICHIGAN LIBRARIES

Atlas Cement Co., subsidiary of U. S. Steel Corp., celebrated his 50th anniversary with the corporation Oct. 4.

—o—

Mark Gardner has been elected president, **International Derrick & Equipment Co.,** Cleveland, subsidiary, Dresser Industries Inc. He will make his headquarters in Dallas, where the company's headquarters are being moved. Mr. Gardner, who was also elected a director of Ideco, succeeds **Oscar M. Havekotte,** president from 1940 until his recent resignation. Mr. Gardner was associated for a number of years with Phillips Petroleum Co., resigning in 1946 to accept the post of vice president of Loffland Bros. and its foreign subsidiaries.

MARK GARDNER

—o—

David Lewis, former executive with Noma Electric Corp., New York, has been appointed general sales manager, Lycoming-Spencer Division, **Avco Mfg. Co.,** New York. In this newly created position Mr. Lewis supervises sales of aircraft and industrial engines and related products, machine parts, gray iron castings, and residential and commercial boilers produced by the division's two plants at Williamsport, Pa. **R. C. Cosgrove** has resigned as executive vice president of Avco, and the position has been abolished with his resignation. Mr. Cosgrove was vice president and general manager of Crosley Corp., sold to Avco in 1945. He remains with the company as a member of the board in a consulting capacity, and will continue to represent the Crosley Division in the Radio Manufacturers Association, of which he is president.

—o—

A. C. Scates has been named sales representative in Mississippi and Louisiana and in the southern portion of Arkansas for **National Radiator Co.,** Johnstown, Pa. His headquarters will be in Jackson, Miss. Mr. Scates served for many years as manager of N. O. Nelson Co.'s branch office in Jackson.

—o—

Samuel F. Newman, chairman of the board of directors of **Landis Tool Co.,** Waynesboro, Pa., recently completed 50 years of service in the machine tool industry. He was guest of honor at a dinner tendered him by Landis Tool board of directors and company officers.

—o—

Walter G. Koch, former senior vice president and executive officer, **International Steel Co.,** Evansville, Ind., has been elected president following election of **Henry Bohnsach,** former president, as chairman of the board. Mr. Koch joined the company 27 years ago. **Wesley D. Hamilton** has been named vice president and director of sales.

—o—

Elias C. Atkins III, formerly manager of mill sales, has been promoted to assistant to the vice president, **E. C. Atkins & Co.,** Indianapolis. He will make his headquarters at the Portland, Oreg., factory branch.

ELIAS C. ATKINS III

—o—

Federated Metals Division, **American Smelting & Refining Co.,** has expanded its business in electroplater's anodes through acquisition of production facilities of Metallurgical Products Co., Philadelphia. Production will will be concentrated at the division's Perth Amboy, N. J., plant under the management of **R. D. Taylor.** The technical staff of Federated will be assisted by **I. W. Wilenchik** of Metallurgical Products Co., and the alloy and specialty products business of Metal'urgical Products Co. will be conducted by Mr. Wilenchik from his company's Philadelphia plant, as in the past.

—o—

Robert C. Howard, district manager for the last 11 years for the comptometer division, **Felt & Tarrant Mfg. Co.,** has been appointed manager of the Los Angeles district office. **Carl A. Lomatch,** Omaha district manager, succeeds Mr. Howard.

—o—

Arthur E. Franks has joined the metals research department, **National Research Corp.,** Cambridge, Mass., where he will be engaged in development of new products and of high vacuum furnaces for metallurgical processing.

—o—

Pittsburgh Steel Co., Pittsburgh, announces appointment of **Charles F. McBride** as traffic consultant, and **Richard N. Shields** as general traffic manager.

—o—

Laurence V. Britt has retired as chairman of the board and of the executive committee of **Burroughs Adding Machine Co.,** Detroit, but will continue as a director.

—o—

J. T. Mathews has been appointed manager of the foreign engineering department, **Westinghouse Electric Corp.,** Pittsburgh. He succeeds **E. P. Schroeder,** retired after 26 years of service with the company. **Marvin W. Smith,** president of Baldwin Locomotive Works, has been elected a director of Westinghouse.

—o—

Kermit R. Sadler has been appointed general traffic manager, **B. F. Goodrich Co.,** Akron. He has served since 1943 as manager of traffic and warehousing at the company's Los Angeles plant. He succeeds **R. W. Corns,** resigned.

—o—

Fred H. Fick has been elected secretary, **International Business Machines Corp.,** New York. He has been assistant secretary since 1947, and associated with the company since 1925.

FRED H. FICK

N. B. ORNITZ

N. B. Ornitz, vice president, **Blaw-Knox Co.,** Pittsburgh, has been appointed manager of foundry operations in the Pittsburgh district, a new position created in connection with the improvement program in progress at three of the company's foundry plants, and is in addition to Mr. Ornitz's other duties. He founded the National Alloy Steel Co. in 1927. This unit, located at Blawnox, Pa., became part of Blaw-Knox Co. in 1929. Mr. Ornitz became a director in 1935 and a vice president in 1937.

R. M. WESTVEER

R. M. Westveer has been appointed general manager, Bassick-Sack Division, **Bassick Co.,** at Winston-Salem, N. C., filling the vacancy created by death of **Ray M. Martin** in September. Mr. Westveer joins Bassick-Sack after two years with Chautauqua Hardware Co., Jamestown, N. Y., and 25 years with Keeler Brass Co., Grand Rapids, Mich., where he worked in various capacities, principally in production and sales. The Bassick Co. is a subsidiary of Stewart-Warner Corp., Chicago.

CURTIS D. CUMMINGS

Curtis D. Cummings has been appointed sales manager, **Allison Co.,** Bridgeport, Conn., manufacturer of abrasive cutting wheels. Associated with SKF Industries Inc. for 12 years, he served that company as sales engineer, and more recently as manager of its industrial sales department. During the war he was a consultant in the bearings branch of the Tools Division, War Production Board. Prior to his work at SKF, Mr. Cummings was an aeronautical engineer with Consolidated Aircraft Corp.

OBITUARIES...

A. J. Jennings, 54, vice president in charge of sales, **Cleveland Worm & Gear Co.,** Cleveland, and of its associate company, **Farval Corp.,** died Oct. 30 following a heart attack. He began his business career with E. F. Houghton Co., Philadelphia, and after 14 years left Houghton to become vice president and general manager of Lubrication Devices Inc., Battle Creek, Mich., predecessor company to Farval Corp. and a pioneer manufacturer of centralized systems of industrial lubrication. Mr. Jennings went to Cleveland in 1932 when Farval was purchased by Cleveland Worm & Gear Co.

—o—

Edward R. Stettinius Jr., 49, former **Secretary of State** and one-time chairman of the **United States Steel Corp.,** died Oct. 31 of a heart attack. He became affiliated with U. S. Steel in 1934. On June 4, 1940, he left U. S. Steel to engage in government defense work. In late 1944 he became Secretary of State, serving for eight months, and later served on the Preparatory Committee of the United Nations Organization, with the title of ambassador. He resigned that position in 1946, subsequently becoming rector of the University of Virginia.

A. J. JENNINGS

—o—

Andrew S. Miller, 75, a founder of **Irvine Forge & Steel Co.,** Irvine, N. Y., died Oct. 27. The plant began operations in 1911 and later became the **National Forge & Ordnance Co.**

—o—

C. V. Kerr, 88, inventor of first steam turbine to be used in merchant ships, and early leader in the development of the modern steam turbine, died Oct. 30. He was president, Kerr Auxiliary Co., Chicago, from 1914 to 1916, and steam turbine engineer for American Well Works Co., Aurora, Ill., from 1916 to 1921. He later was president, **National Pump & Motor Co.**

—o—

Harry H. Rinquest, 37, Fresno, Calif., branch manager, **International Business Machines Corp.,** died Oct. 28.

—o—

F. A. Wickerham, 66, assistant to the vice president in charge of research and technology, **Carnegie-Illinois Steel Corp.,** Pittsburgh, died Oct. 20.

—o—

L. Royal Hooper, 55, superintendent of steel control for **Cleveland Hardware & Forging Co.,** Cleveland, and its predecessors for 30 years, died recently.

—o—

Harry B. Stewart, 56, executive vice president and general sales manager, **Metal Tube & Housing Co.,** Dover, N. J., died Oct. 30.

—o—

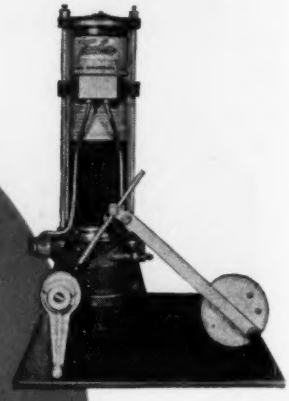
Val Hansel, 42, New York sales manager, **Peter A. Frasse & Co. Inc.,** New York, died Oct. 25. He joined Frasse in 1925, and was appointed sales manager in New York in 1939.

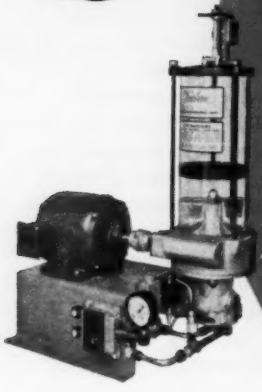
UNIVERSITY OF MICHIGAN LIBRARIES

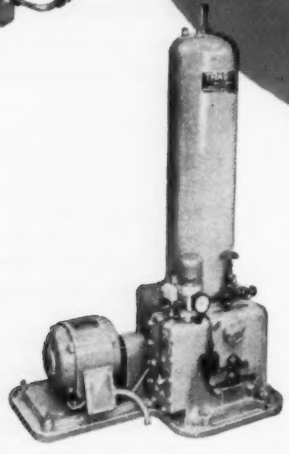
"There are more Trabon automatic systems in operation than all other makes!"

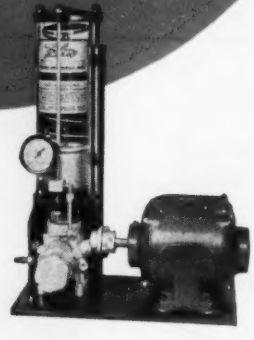
Trabon

Leads in AUTOMATIC LUBRICATION









• WRITE FOR YOUR COPY OF BULLETIN E 469

• Trabon oil and grease systems have ONE indicator at the pump — assuring the proper measured amount of lubricant to each point. Trabon systems are SEALED — no exposed parts . . . operate efficiently under dust, dirt, water, or grime.

With 20 years of experience in engineering and installing lubrication equipment, Trabon can save you time and money. Regardless of size or type of machine, there is a Trabon system to fill your need. Call or write today.

Trabon

OIL AND GREASE SYSTEMS

TRABON ENGINEERING CORPORATION
1814 East 40th Street • Cleveland 3, Ohio

Production AND Engineering NEWS AT A GLANCE

AMPLIFIES RESEARCH DATA—Extremely valuable research information is currently obtained by dynamic strain-gaging equipment at the research laboratory of National Tube Co., Pittsburgh. Loads on the plug and bar while seamless steel tubing is rolled in the high mill is determined instantaneously by the setup. In another case, figures are obtained on strains and stresses set up in a drill pipe joint while the joint is being assembled, and later, while the joint is tested by bending.

HIGHER HIGH TEMPERATURE ALLOY— A metallic compound, zirconium boride, developed under an Office of Naval Research contract, can withstand temperatures up to 600° F the Department of Defense reveals. The compounding process, using zirconium and boron, provides an alloy which survives higher temperature blasts than any material tested extensively to date. It may be used in modern gas turbines, and in jet and rocket engines.

TOOL ROOM TIME SAVER— Time-saving tool room accessory for tool room and semiproduction lathes currently built by Elwood Products Co., Detroit, saves 3 to 10 minutes on every job. A micrometer stop and lathe carriage spacer combined, it permits faster, more accurate setting for boring holes to greater depth, accurately spacing shoulders, grooves and undercuts on all turning jobs.

TWO-IN-ONE JOINING— Advantages of fusion welding and brazing minus their disadvantages are combined in a new welding method developed by Uniworld Research Corp. of America, Cleveland. According to the company, the development vitally improves the weldmetallurgy of steels in general. This is done by reducing heat input and by the use of a new type bond. The process may be used in joining and building up without fusion both ferrous and nonferrous metals and alloys.

PENETRATING DEVICE—Ultrasonics or high-frequency sound waves will prove immensely useful to industry in the near future, it is predicted. According to Norman F. Barnes, General Electric engineer, ultrasonic energy can be employed in many places where it is difficult to place other types of energy. He pointed out that it is possible to concentrate a kilowatt, nearly 1 horsepower, in the form of sound into an area a centimeter square. This is ten times the concentration of power in a white-hot tungsten lamp filament. Recent experiments indicate sound waves may be useful in mixing alloys.

HEATLESS WELDING—Revolutionary new process of welding metals without electricity or any applied heat soon will be available to American industry, according to William Dubilier, founder and technical director of Cornell-Dubilier Electric Corp. American rights are now vested in the hands of a group of business men forming the Koldweld Corp., he revealed. The process which is used for many applications in England, can be employed with metals of any thickness, from very thin foil of less than a thousandth of an inch to the heaviest metals. It is believed the development will change drastically current practices in industrial and job welding, particularly where aluminum is involved.

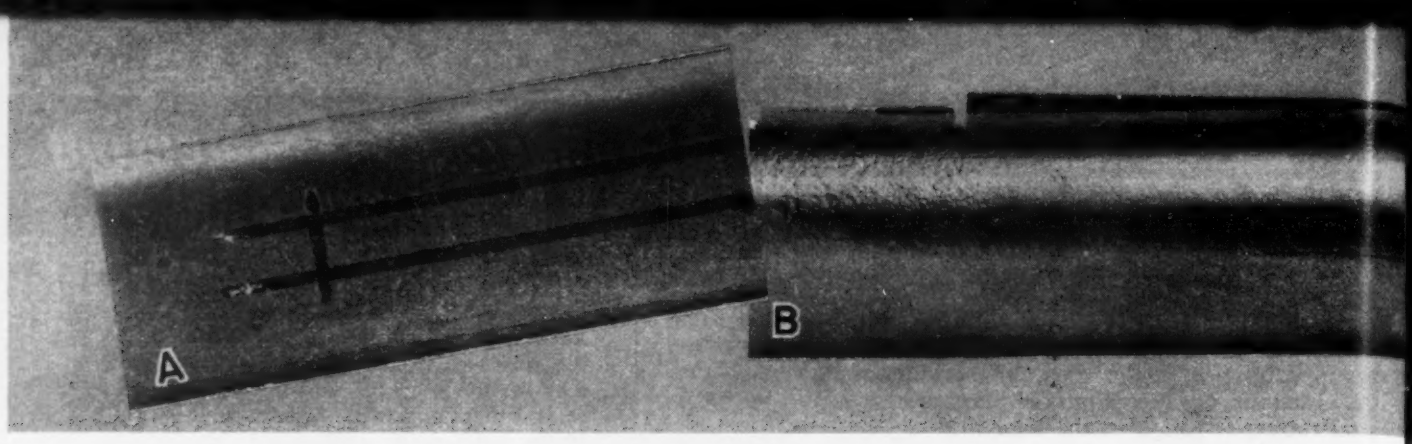
CHROMIUM PLATING STEEL—Advantages of chromium plating in the absence of proper precautions may be offset by the adverse effect of the plating on the fatigue limit of the base metal, according to extensive studies made recently. Hugh L. Logan, National Bureau of Standards, Washington, in examining the effect of chromium plating on the fatigue limit of aircraft steels—under sponsorship of the Navy's Bureau of Aeronautics—discovered some information of interest not only to aircraft manufacturers, but also to other industries that produce or use chromium-plated parts. (p. 110)

CUPPING THICK BLANKS—Cupping of thick steel blanks is not yet well understood. Principal difficulty seems to be in obtaining an even cup with a uniform wall thickness. Theoretically, it is pointed out, reduction in thickness in the cupping operation should be slightly smaller than it is during a redraw, because thickness of a blank edge increases during cupping so long as the clearance between die and punch is sufficiently large to avoid ironing. For a 30 per cent diameter reduction, increase in thickness at the edge of the mouth would be about 15 per cent. Thickness reduction of 50 per cent of the blank thickness would therefore actually be almost 60 per cent reduction by ironing in the wall thickness of the cup—if such a cup is formed without first ironing (p. 112)

PROMOTES HARDNESS—Chief advantage of a casting method employed by Electronicast Inc., Chicago, is the ability to cast metals possessing high melting points and extreme hardness. It is particularly adaptable to small parts—up to 5 pounds—of intricate design where strength must be high and cost of machining operations prohibitive. (p. 116)

CUTS GRINDING TIME—Savings of 50 to 60 per cent are not unusual in jobs involving grinding of small templates, gages, and component parts of stamping, piercing or forming dies by a procedure devised at Cincinnati Milling Machine Co. The grinding method makes use of an optical projection system that not only confines each task to only one setup but enables an operation to be carried through from start to finish without interruption. (p. 118)

UNIVERSITY OF MICHIGAN LIBRARIES



How Chromium Plating Affects

Fatigue Life of Aircraft Steels

Advantages of chromium plating, in the absence of proper precautions, may be offset by adverse effect of plating on fatigue limit of the base metal. Aircraft manufacturers and other users of chromium-plated machine parts will be interested in these constructive findings of National Bureau of Standards investigators working on SAE X4130 and 6130 steels

IN ADDITION to decorative use on such articles as automotive headlights and bathroom fixtures, chromium plating is widely used on gages, cylinder walls, piston rings, and other machine parts where resistance to wear is an important factor. However, the advantages of chromium plating, in the absence of proper precautions, may be offset by the adverse effect of the plating on the fatigue limit[1] of the base metal. Recently Hugh L. Logan of the National Bureau of Standards made an extensive study of the effect of chromium plating on the fatigue limit of steels used in aircraft. This investigation,[2] sponsored by the Bureau of Aeronautics, Department of the Navy, provides information of interest not only to aircraft manufacturers but also to a number of other industries which produce or utilize chromium-plated machine parts.

Specimens about ¼-inch in diameter were machined from three lots of SAE X4130 rod and one lot of 6130 rod, (see accompanying table). The X4130 steel was either normalized to a Rockwell

Fig. 2 (left)—Relationship between endurance limit and plate thicknesses of SAE X4130 and 6130 steels

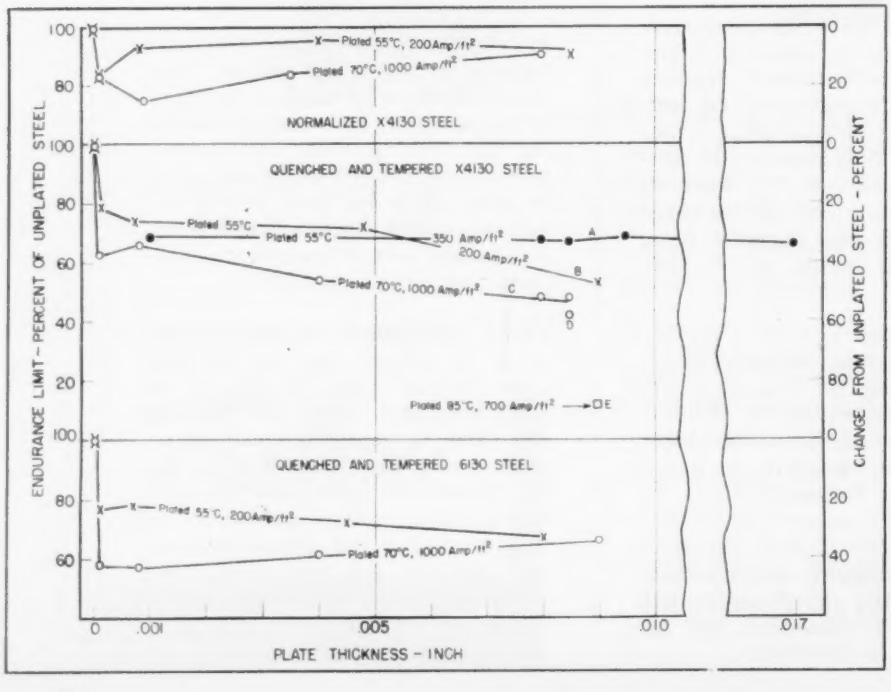
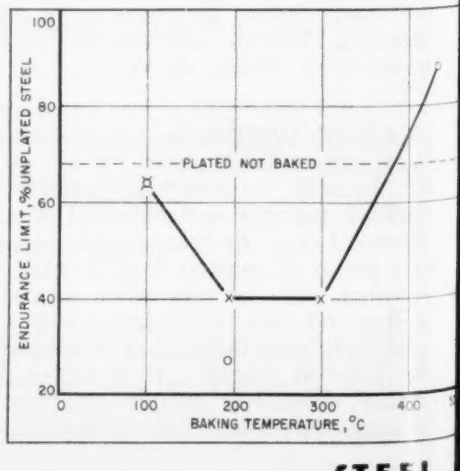


Fig. 3 (below)—Effect of baking temperature on fatigue limit of SAE X4130 steels in experiments carried out at National Bureau of Standards. Circles indicate specimens baked in air and crosses specimens baked in organic liquids



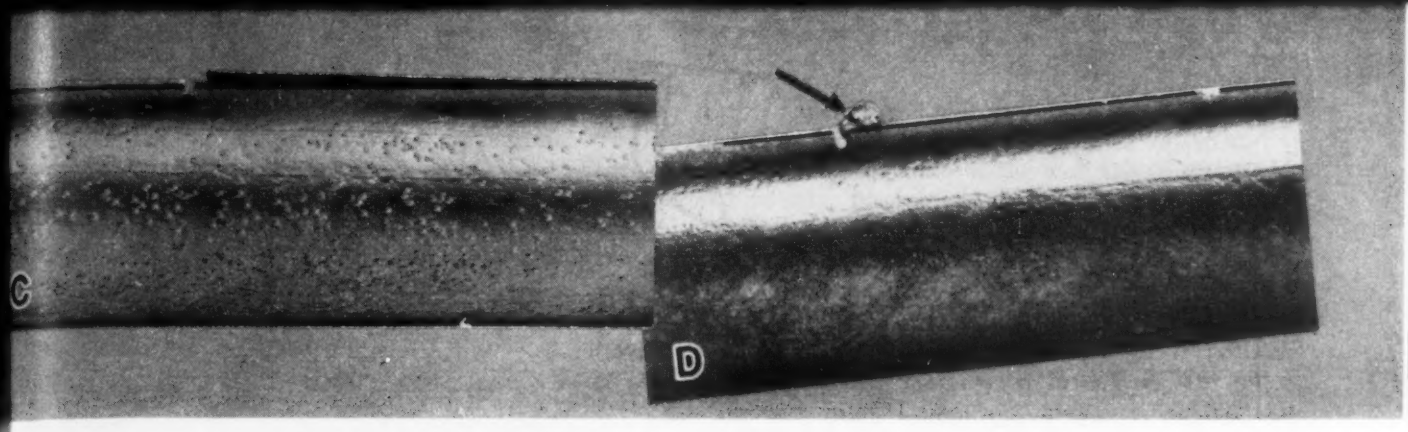


Fig. 1—Effect of heat treatment on residual stresses in chromium-plated steels was illustrated by means of "tongues" cut in thin-walled tubes of annealed steel. (A) Top view of tube showing tongue; (B)(C)(D) side views of tubes showing deflection of tongue. (B) Tube plated, heated at 200° C, and tongue subsequently cut. (C) Tube plated, tongue cut and tube subsequently heated at 200° C. (D) tube plated, heated at 440° C, and tongue cut; a 3/16-inch ball bearing (indicated by arrow) is resting on depressed tongue surface

hardness of 90-B or quenched and tempered to a hardness of about Rockwell 40-C, while the 6130 steel was quenched and tempered to a Rockwell hardness of 33-C. After grinding, polishing and chromium-plating, the specimens were subjected to fatigue tests in the R. R. Moore type of rotating-beam machine operating at 1800 or 3600 rpm. Eight or 10 specimens usually were required to obtain the fatigue limit for any one set of conditions.

Fatigue Limits Reduced—In all cases, chromium plating was found to reduce the fatigue limits of the steels studied, although the effect was less pronounced under some conditions than others. In general, the reduction in fatigue limit increased with increased hardness of the steels. For steel of a given hardness, the fatigue limit decreased with increased temperature of the plating bath. While plate thickness appeared to have little effect on the fatigue limit of specimens plated in a bath at 55° C and a current density of 350 amp per square foot, no generalizations could be made regarding the effect of this factor at other current densities and temperatures, Fig. 2.

It was discovered that the fatigue limits of specimens plated and subsequently ground to remove a part of the plating were equal to or greater than those of specimens initially plated to the same thickness as the ground specimens and tested as plated. Other experiments showed that interruptions of the plating process did not reduce the fatigue limit of the plated specimens provided proper precautions were taken for continuing the plating.

Chromium-plated objects often are heated to temperatures between 90° and 200° C with the object of improving their mechanical properties by expelling the hydrogen deposited with the chromium. A systematic study was therefore made of the effect of heating on the fatigue limit of chromium-plated steel. The results showed that the fatigue limits of quenched and tempered specimens heated after plating decreased to a minimum value for some heating temperature between 100° and 300° C and thereafter increased with increased heating temperatures, Fig. 3. Fatigue limits of specimens heated for 1 hour at 440° C in some cases were 87.5 per cent of that of the unplated steel, whereas fatigue limits of specimens plated but not heated, and of specimens heated 1 hour (in air) at 193° C, were only about 68 and 27 per cent, respectively, of those of the unplated steel.

Causes of Adverse Effect—Three possible causes for the adverse effect of chromium plating on the fatigue limits of the steels were: (1) Embrittling effect of hydrogen deposited with the chromium, (2) cracks in the chromium, and (3) residual stresses in the chromium. However, it was shown that there was no simple relationship between the fatigue limit and the amount of hydrogen remaining in the chromium after a baking treatment. Further experimental evidence indicated that cracks present in the chromium were not the principal cause of the reduced fatigue limits of the plated steels.

It is generally agreed that residual stresses in a material markedly affect its fatigue limit. Thus, in steel, compressive stresses, such as are produced by shot peening, increase the fatigue limit; tensile stresses have the opposite effect. In order to show the presence of tensile stresses in electrodeposited chromium and the effect of heat treatment on these stresses, thin-walled tubes of annealed steel were chromium-plated and subsequently heated to different temperatures. "Tongues"—strips about 3/16-inch wide 2 inches long, with one end left attached—were then cut in the tubing, Fig. 1, to permit a qualitative evaluation of stresses in the chromium plate.

Tongues cut in plated tubing that had not been heated were found to bend slightly outward from the surface of the tube, indicating the presence of residual tensile stresses in the plated layer. Baking the plated tubes at temperatures around 200° C was found to increase further the tensile stresses in the chromium, as shown by the greater bending of the tongue away from the tube surface.

Increased Tensile Stresses—From these observations, it was concluded that the decreased fatigue limit accompanying the heating at 200° C of the plated fatigue-test specimens was due to increased tensile stresses induced in the chromium plate. This conclusion has been further substantiated by experiments showing that electrodeposited chromium subjected to a heating-and-cooling cycle increases in density and thereby contracts; since (*Please turn to Page* 142)

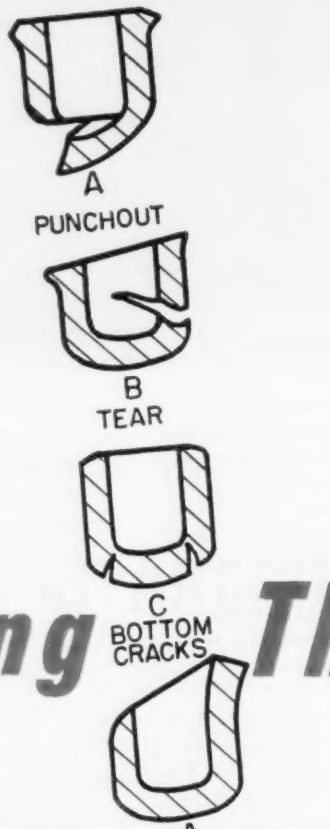
1. Maximum stress a part will withstand without failure for a specified large number of repeated or cyclic stresses.
2. For further details see, "Effect of Chromium Plating on the Endurance Limit of Steels Used in Aircraft," by Hugh L. Logan, J. Research NBS 43, 101 (1949) RP2011.

UNIVERSITY OF MICHIGAN LIBRARIES

Cupping Thick Steel

Applicability of this cold forming technique to successful fabrication of parts the size of 0.30-caliber cartridge cases hinges on several fundamental points. In this first section of a two-part article the authors review experimental methods used to study cupping phenomena, contours of cupping dies, stress and strain relations, breaking conditions, cupping and ironing forces

By G. SACHS
Consulting Engineer
G. ESPEY
Metals Research Associates
and
J. TAUB



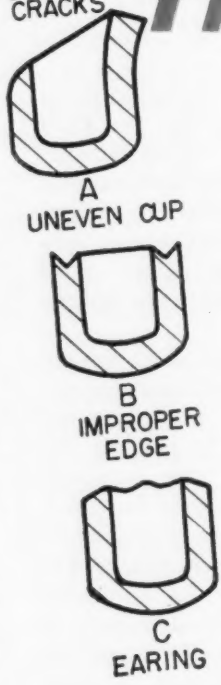


Fig. 1 (top)—Types of failures on cupping thick metal
Fig. 2 (bottom)—Two types of defects in thick cups

ALTHOUGH cupping of thin blanks has been explored thoroughly, the cupping of thick blanks is not well understood as yet. Successful cupping involves the following definite requirements if the cup is to be suitable for redrawing, such as the manufacture of cartridge cases and other articles in which the wall is subjected to considerable ironing: (a) The cup must be formed without breakage or cracking, Fig. 1. (b) It must be uniform in shape. This relates to a uniform wall thickness and an even top or mouth, Fig. 2, as well as to the contour of the mouth edges which must permit redrawing without tearing or splitting at the mouth.

Size of the cup in commercial work is usually a compromise between the quality requirements listed above under (b) and the tendency to perform maximum reductions in this operation, in order to obtain a final drawn-piece with the use of a minimum number of operations. These reductions during cupping consist of two components which are to a considerable extent independent, the reduction in diameter and the reduction in wall thickness, respectively.

The limiting reduction in diameter can be expressed, according to numerous investigations, in the simplest manner by the ratio of the minimum punch diameter which can be used without causing breakage to the blank diameter.

Minimum Punch Diameters—For most metals of deep drawing quality and tools of favorable contour, the minimum punch diameters are approximately 45 per cent of the blank diameter. A smaller punch will cause a punch-out of the cup bottom, Fig. 1. If the above limiting condition can be applied to thick metal where the cup wall thickness is anywhere between 5 and 10 per cent of the blank diameter, the possible minimum (outside) cup diameter would be between 55 and 65 per cent cent of the blank diameter, or the maximum reduction in diameter would be between 45 and 35 per cent.

Maximum reduction in thickness, which can be obtained if the wall of a tubular part is ironed is well over 50 per cent. This has been found to be true for redrawing brass shells as well as for the fundamentally identical process of drawing tubing with a moving mandrel in either annealed or cold-worked metals. Theoretically, the reduction in thickness in the cupping operation should be slightly smaller than is possible during a redraw, because the thickness of the edge of a blank increases during cupping as long as the clearance between die and punch is sufficiently large to avoid ironing.

For a diameter reduction of 30 per cent, this increase in thickness at the edge of the mouth would be approximately 15 per cent. A reduction in thickness of 50 per cent of the blank thickness would therefore actually be almost a 60 per cent reduction by ironing in the wall thickness of the cup, if such a cup is formed first without ironing. Commercially, the possible maximum reduction in thickness from the blank thickness to the thickness of the edge of the cup has been found to be in the vicinity of 50 per cent. If a much higher reduction in wall thickness is attempted, the wall of the cup will tear, Fig. 1.

Contour of Cupping Die—According to the above considerations, one of the factors which should affect

the possible maximum reduction in thickness from the blank to the cup is contour of the cupping die. The contour determines the overlapping of the two reductions in cupping, namely, thickness reduction and diameter reduction, and it consequently determines the actual reduction in thickness. However, no information is available in this direction.

Reasons for the combination of rather small diameter reductions with quite large reductions in thickness in commercial cartridge case drawing are not known definitely. However, it appears that the principal difficulty in cupping very thick metal is obtaining an even cup with a uniform wall thickness. In order to achieve this purpose, a tandem die arrangement has been recommended, Fig. 3. The top die principally folds the metal with little reduction in

ee Blanks

wall thickness, while the bottom die centers the preformed cup and irons the wall.

Contour of the die working face appears to be of major influence on the shape of the cup edge. A V-shaped edge, Fig. 2b, is very difficult to avoid in steel. Such an edge is undesirable for it results in the formation of a lap during redrawing, and eventually leads to failure. Such a condition might require trims otherwise avoidable and/or decrease the maximum possible reductions in the redraws.

"Earing" on cupping, Fig. 2c, is a defect of minor significance, which only slightly affects the trimming allowance. It results from a preferred orientation in the metal, and it is not affected by the tool design.

Many different die contours are commercially used, Fig. 4. These die contours are mostly of one of two types: They are either flat on top and tapered at the bottom, the two parts being blended by a small radius, Fig. 4a, or the die is wide open or bell shaped at the top and also tapered at the bottom, Fig. 4b. The half die angle of the tapered part may be as small as 5 degrees, or as large as 20 degrees. The larger the die angle, the lower is the radial force which tends to burst the die, and the outside diameter and/or thickness of the die may be correspondingly decreased. For this reason probably, cemented carbide dies which have a low tensile strength usually are made to a large die angle. Little is known fundamentally regarding the proper shaping of the upper part of the die contour. This part of the die is important; it determines, to a considerable degree, the shape of the cup edge. Draw forces also depend upon die contour.

Cupping dies are made from hardened steel or cemented carbide. The cupping punch may be either tapered or cylindrical, and usually possesses a radiused tip. There does not seem to be much difference between the performance of cups formed on either tapered or cylindrical punches, the deciding factor apparently being the wall thickness at the edge. The maximum possible taper is determined by the fact that the ratio of the wall thicknesses at top and bottom, respectively, should be smaller for the cup than for the final drawpiece. The punch tip radius may be 100 per cent of the blank thickness for large cases and less than 50 per cent of the metal thickness for smaller cases. This radius should permit the forming of the final contour of the head by progressive slight changes during the various draws.

Material and Procedure—Steel used throughout this investigation was received in the spheroidized condition in the form of strip 1.25 inches wide and 0.147-inch thick. The analysis was 0.35 carbon, 0.64 manganese, 0.013 phosphorus, 0.024 sulphur and 0.14 silicon. Blanks of various diameters were sheared to dimensions using clearances listed in Table I.

Majority of the blanks were cupped in the as-blanked condition without cleaning or copper flashing, in order to approach the actual conditions of commercial fabrication. There was no apparent difference between the cups fabricated in this manner and those made with thin copper deposit on surface.

Cupping operations were performed on a 10,000/60,000-pound hydraulic testing machine having a maximum speed of 2½ inches per minute, or on a mechanical crank press having a speed of 90 rpm.

In all cases it was found to be extremely important that proper guiding of the tools and blank be maintained. Therefore, rings to position the blank and punch guides were used which had been ground to close tolerances to fit the die shoe and the punch, respectively, so that blank, punch and die were lined up as accurately as possible.

Dies for these tests varied in contour and size and are listed in Table II. Most of the dies were straight taper construction with a radius at the opening of the die. A few of the dies, however, contained as many as three angles which were broken by radii so that no sharp corners were present in the die. The radii at the opening of the dies were the same in most cases, although a number of dies, having a 7-degree half die-angle but different die radii were also used to study the effect this variable would have upon the resulting cup.

Polished cylindrical punches ranging in size from 0.400 to 0.600-inch and having tip radii of 0.060-inch were employed. Lubricant used in the cupping process was a 50 per cent water solution of a commercial fat-soap lubricant with filler.

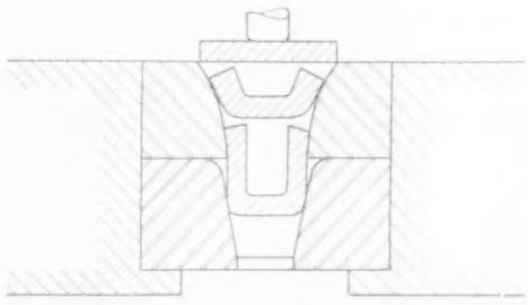


Fig. 3—Schematic representation of cupping in a tandem die arrangement

This article summarizes some results of recent experimentation conducted at Case Institute of Technology, Cleveland, as part of an investigation sponsored by Frankford Arsenal, Philadelphia.

UNIVERSITY OF MICHIGAN LIBRARIES

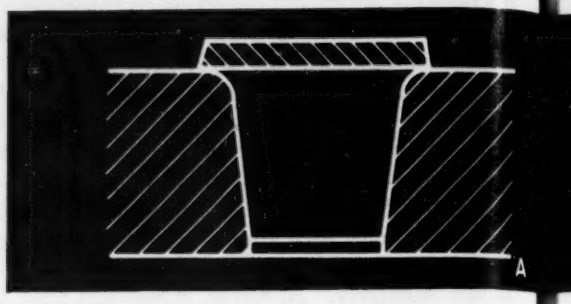
Stress and Strain Relations in Cupping—Before discussing the effect of variables on the cupping process, it is necessary to explain the general stress and strain relations during cupping. As previously mentioned, cupping reduces the initial blank both in diameter and in thickness. These two reductions represent two components of the cupping procedure which are fundamentally independent of each other. It is feasible to perform a cupping operation without any reduction in wall thickness. In fact, such a cupping proper is more comomn for thin metal than cupping with simultaneous wall thinning or ironing.

Ironing can be added then as a cepaarte operation or by the assembly of two dies in tandem, Fig. 3. Such a tandem cupping has been recommended in order to improve the evenness of the cup.

In this procedure, the force-stroke curve will be comprised of the two independent respective force-stroke curves for cupping proper and ironing, as illustrated in Fig. 5. The two partial force-stroke curves are separated by a stroke interval which depends upon the spacing of the two dies in tandem. If this spacing is smaller than a certain value, the metal will enter the bottom (ironing) die while it is still in the process of cupping, Fig. 3. Consequently, the two respective force-stroke curves will be superimposed, the extent of overlapping depending upon the spacing, and also upon the design of the top (cupping) die. Contour of the cupping die may be such as to form the greater part of the cup either in its upper or in its lower portion, and the maximum force may be correspondingly reached either early or late in the cupping procedure. Contour of the cupping die is also of paramount influence on the magnitude of the maximum cupping force.

However, most commercial cupping is performed with a single die, and the cupping proper and ironing may then occur practically simultaneously. General use of dies with a taper in their lower part, Fig. 4b, can be considered as an attempt to separate the ironing from the cupping proper. Consequently, such a die can be considered academically as a tandem die with zero spacing. The force-stroke curve for such a die may or may not illustrate the two partial operations, Fig. 6, depending upon the contour of the die and the punch diameter, which determine the extent of superposition of the two partial operations.

Breaking Conditions — Respective breaking conditions for cupping proper and ironing also can be expected to be different. In cupping, the maximum



strain may be the shear in the circumferential section of the blank on which the punch corners act. Or it may be the tension developed parallel to the surface and radial in respect to the initial blank by the punch, against the bending and folding resistance of the metal resting on the die corners, whichever of the two comes closer to the respective strengths of the metal. Investigations on thin sheet have shown that a tension failure usually occurs on cupping if the punch diameter is less than about 45 per cent of the blank diameter, providing tools have a suitable contour.

Ironing of a cup is, on the contrary, a drawing process of the same type as the drawing of tubing over a mandrel or rod. Theoretically, a maximum reduction in cross-sectional area of approximately 65 per cent can be expected. This high value is caused by the fact that the friction between cup and punch transfers force and consequently relieves the metal from some tension. Such high values of drawability, up to 70 per cent and more, have been confirmed in experimentation on tubing and cartridge case drawing, both for brass and for steel.

On commercial cupping the force-stroke curve may have either one or two maxima, depending upon the extent of overlapping of the two processes. Also in the case of two maxima, either the first or the second maximum may be the larger depending upon the respective reductions in diameter and in wall thickness. If the reduction in diameter is large and the reduction in thickness is small, the first maximum will be the larger and vice versa. Other factors which offset this relation are again the design of the die and also the flow characteristics of the metal.

Maximum Values of Force—As the maximum values of force govern the size of the press, particularly when hydraulic equipment is to be used, the effect of various factors on the maximum drawing forces was measured for a few conditions. The ironing force is determined primarily by the magnitude of the reduc-

TABLE I
DIMENSIONS OF BLANKS USED

Blanking Die Dia. Inches	Blanking Punch Dia. Inches	Total Clearance % of Thickness
0.935	0.905	20
0.935	0.933	1
0.950	0.905	31
0.950	0.933	12
0.975	0.905	48
0.975	0.933	29
1.000	0.933	46
1.000	0.960	28
1.000	0.970	20
1.050	0.970	55
1.100	0.998	70
1.100	1.042	40

(A) CUPPING DIES AVAILABLE FOR INVESTIGATION

Diameter Inch	Half-Die Angle Degrees
0.655	Various
0.670	Various
0.685	Various
0.705	7
0.720	7
0.720	9
0.740	9
0.740	12
0.760	7
0.780	7
0.800	7
0.820	7
0.766	Cylindrical (various radii)

TABLE II
(B) CUPPING DIES DESIGNED FOR INVESTIGATION

Designation	Land Dia. Inch	Die Opening Dia. In.	Half-Die Angle Degrees: Entrance	Middle	Exit
A	0.720	0.975	30	20	9
B	0.720	0.975	25	15	7
B_1	0.720	1.000	25	15	7
B_2	0.720	1.000	25	15	7
C	0.720	0.975	20	..	9
D	0.720	0.975	30	20	9
E	0.720	0.975	50	25	7
F	0.720	1.000	25	15	9
G	0.720	1.000	25	15	9
H	0.720	1.000	25	15	7

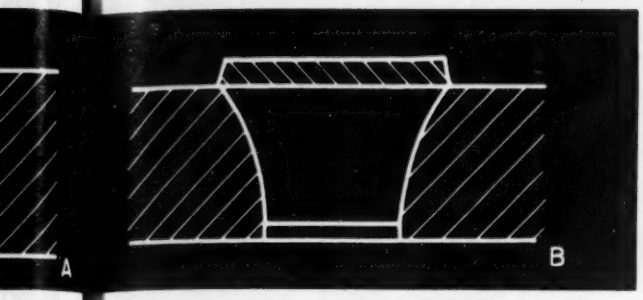


Fig. 4—Types of cupping die contours

tion in cross-sectional area, while the die contour has but slight effect. Consequently, it should be expected that if cupping is associated with very heavy ironing, the maximum cupping force should be high if cupping and ironing take place simultaneously, as when cylindrical dies are used. It should be low if the ironing is separated from the cupping proper, such as occurs in tandem die cupping.

With small reduction in wall thickness, the die contour may be decisive regarding the maximum for cupping. Thus the maximum for such cupping increased considerably with decreasing radius at the die opening of a cylindrical die. The available tapered dies did not permit a clear comparison because of the variations in their die contour and dimensions, the effects of which cannot be readily evaluated.

Highest cupping forces observed were below an upper limit which can be represented as follow:

$$P = (R_1 + R_2/2) \times A \times S_u$$

where $A = \pi \times D \times t$, D = diameter of the blank, t = thickness of the blank, S_u = 60,000 psi = ultimate strength of the steel, R_1 = reduction in diameter, R_2 = reduction in wall thickness.

For a die which separates the greater part of the wall reduction from the cupping, the maximum cupping force may be represented approximately by the following equations: $P_{max.} = R_1 \times A \times S$ or $P_{max.} = R_2/2 \times A \times S$, whichever of the two is larger.

In cupping steel the cupping proper appears to be the deciding factor regarding the maximum for the greater part of the range of possible reductions. On cupping brass, however, the first maximum has been found to surpass the second only if the wall reduction is small, that is, lower than 20 per cent for the selected die. This is explained by the fact, known from experimentation on thin walled metal, that the maximum force in cupping usually is reached in the first part of the stroke corresponding to small reductions. As brass possesses a very low yield strength in the soft condition, the cupping force should be low in comparison with the ironing force. This ironing force is determined by the resistance of the metal subjected to the full range of reductions, starting with the metal previously hardened by cupping.

Regarding the effect of die design on the shape of the force-stroke curve and on the maximum force in particular, a desired reduction in maximum force may be accomplished either by spacing the cupping proper from the ironing and/or by selecting a die contour which results in minimum values of both components, other factors being constant.

(To be concluded)

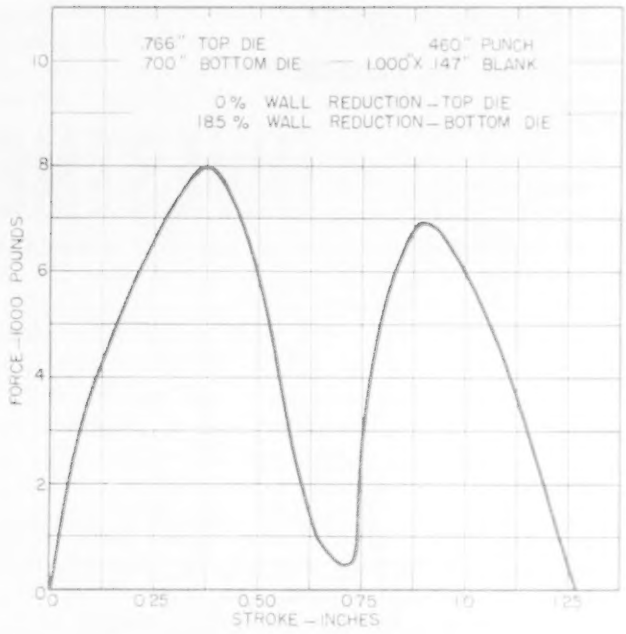


Fig. 5—Force-stroke curve for tandem die arrangement with no ironing in top die

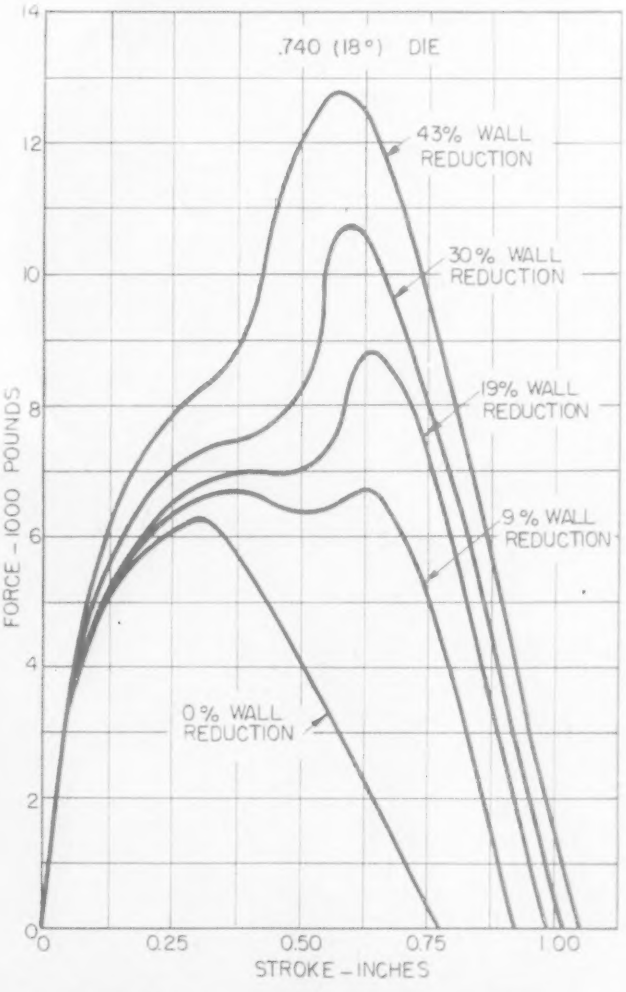


Fig. 6—Effect of various reductions in wall thickness on the force-stroke curve when cupping with single die

UNIVERSITY OF MICHIGAN LIBRARIES

Centrifugal and Vacuum

INVESTMENT CASTING

. . . used to produce intricate, close-tolerance parts from difficult-to-cast alloys

By E. F. ROSS
Chicago Engineering Editor, STEEL

EXPANDING acceptance of the investment casting process for production of small close-tolerance metal parts in intricate shapes, and from alloys which because of their extreme hardness or melting characteristics are not amenable to conventional methods of fabrication, continues to promote research aimed at improving casting techniques.

Casting by the investment method is not new. Based on the lost-wax process, it has been used many years in the dental and jewelry fields. The procedure achieved industrial prominence during the war when it was adapted to production of blades and other parts for turbines and superchargers from heat-resisting alloys machinable only with greatest difficulty, also

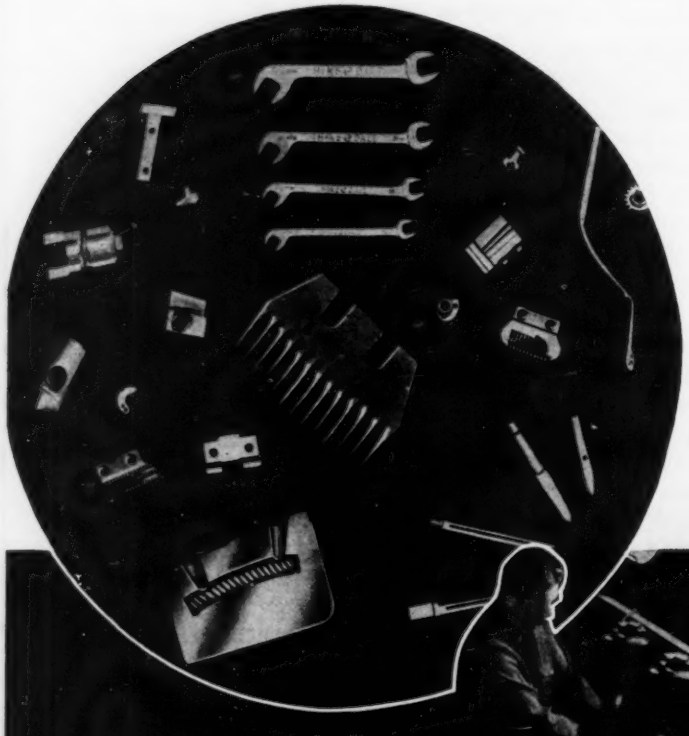


Fig. 1 (left)—Centrifugal and vacuum investment casting is adaptable to small parts of intricate design requiring high strength

Fig. 2 (below left)—Patterns of polystyrene plastic are assembled into clusters by attaching gates and a sprue. Mixing mold investment is shown at upper right

Fig. 3 (below)—Shown here are two of the three centrifugal casting machines and high frequency induction melting equipment. Flasks in the electric oven for mold drying are shown in center background. Furnaces for burning out the plastic from the molds are at right

for small precision gun parts requiring extreme wear resistance. Experience thus gained has been used since the end of the war to take full advantage of the process in the manufacture of peacetime products.

A recent entry in the investment casting field is Electronicast Inc., Chicago. Organized in July, 1948, the company devoted the better part of a year to experimental work and perfection of procedures. Its facilities include equipment for induction melting and centrifugal or vacuum casting of carbon steels, low and high alloy steels, stainless steels, tool steels, special alloys, beryllium copper, brass, aluminum alloys and manganese bronze.

Some of the parts the company produces are shown in Fig. 1. These include ignition wrenches, sewing machine parts, stapling machine parts, inserts for plastic injection molding dies, inserts for permanent molds, radio components, gun parts, photoengravers' routing bits, draftmen's pens, gage parts, universal joints and similar items.

Plastic Patterns—While some use is made of wax patterns, bulk of production is through utilization of polystyrene plastic patterns. These patterns are assembled into cluster formations as shown in Fig. 2, by using heat to attach the individual patterns to plastic gates and a plaster sprue button. After the patterns are thus aggregated, the cluster is sealed onto a hard rubber base.

Next the plastic patterns are dipped in a fine slurry of silica sand to give precoat strength, and allowed to air dry for about 15 minutes. A stainless steel flask, either cylindrical or square, is placed over the cluster and the secondary investment of commercial silica is poured in. After the investment material has solidified, but prior to curing, the rubber base is removed.

Fig. 4 (below, left)—Clusters of castings shaken from molds are given a smooth machine-like finish by a fine and blasting operation

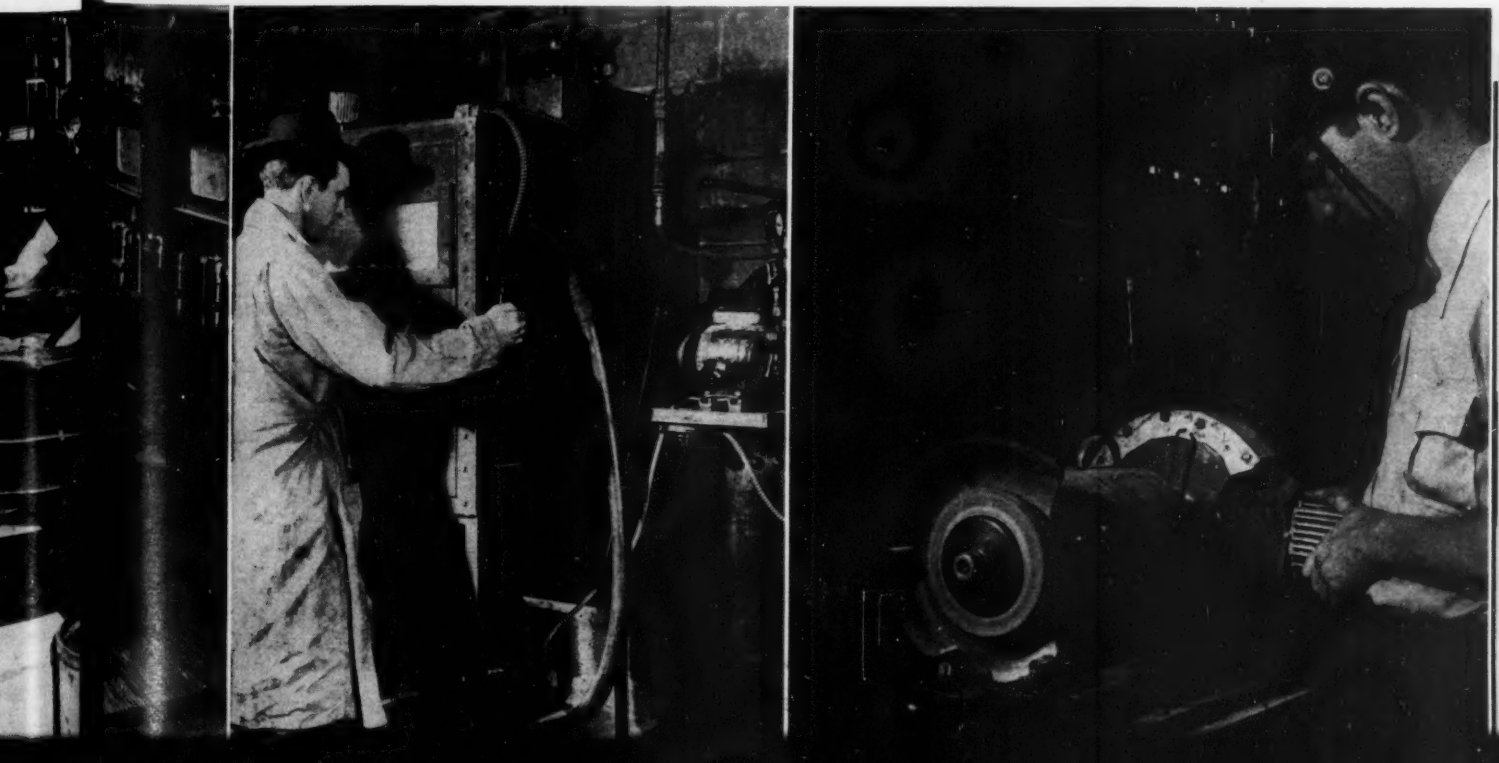
Fig. 5 (below, right)—Finished parts are removed from gates and sprues with high-speed cutoff wheels

Molds are cured by placing the flasks in an electric drying oven where they remain for about 16 hours at a temperature ranging from 150 to 200° F. From this oven, shown in the background of Fig. 3, the flasks are transferred to one of five batch-type gas-fired furnaces, standing in line to the right of the drying oven. Temperature is raised slowly in these furnaces. At approximately 750° F, the plastic patterns are burned out and following this the flasks are brought up to a red heat, usually 1600 to 1800° F. Maintaining the flasks in an oxidizing atmosphere for about 2 hours results in elimination of all the plastic pattern residue and other volatile matter from the refractory mold material. Molds are now completely cured and are ready for the metal charge.

Filling Molds—The molds are filled with metal in one of three automatic horizontal centrifugal casting machines or on a vacuum casting setup of the company's own design. Choice of technique depends upon the parts being cast. The centrifugal casting machines, shown in Fig. 3, provide for induction heating of the metal; because of the close temperature control which can be maintained, they permit pouring to a most exacting degree.

Charges consist of small pieces of virgin metal carefully weighed out and placed in standard centrifugal casting crucibles made of ceramic fire clay or mullite. These crucibles, which average 2 pounds in weight, range from 2½ to 3½ inches diameter at the base and 5 to 6 inches diameter at the top. When a crucible is placed in the clamping fixture of the casting machines, a water-cooled copper coil is lowered over it. This is connected to one of two high-frequency induction heating machines equipped with automatic timing devices. One machine is 35 kva capacity, the other 16 kva. Current is turned on and the metal is melted at the rate of approximately 1 pound per minute.

When the metal is at the proper temperature—1200 to 2000° F in the case of (*Please turn to Page* 144)



UNIVERSITY OF MICHIGAN LIBRARIES

Simultaneou

GRINDING

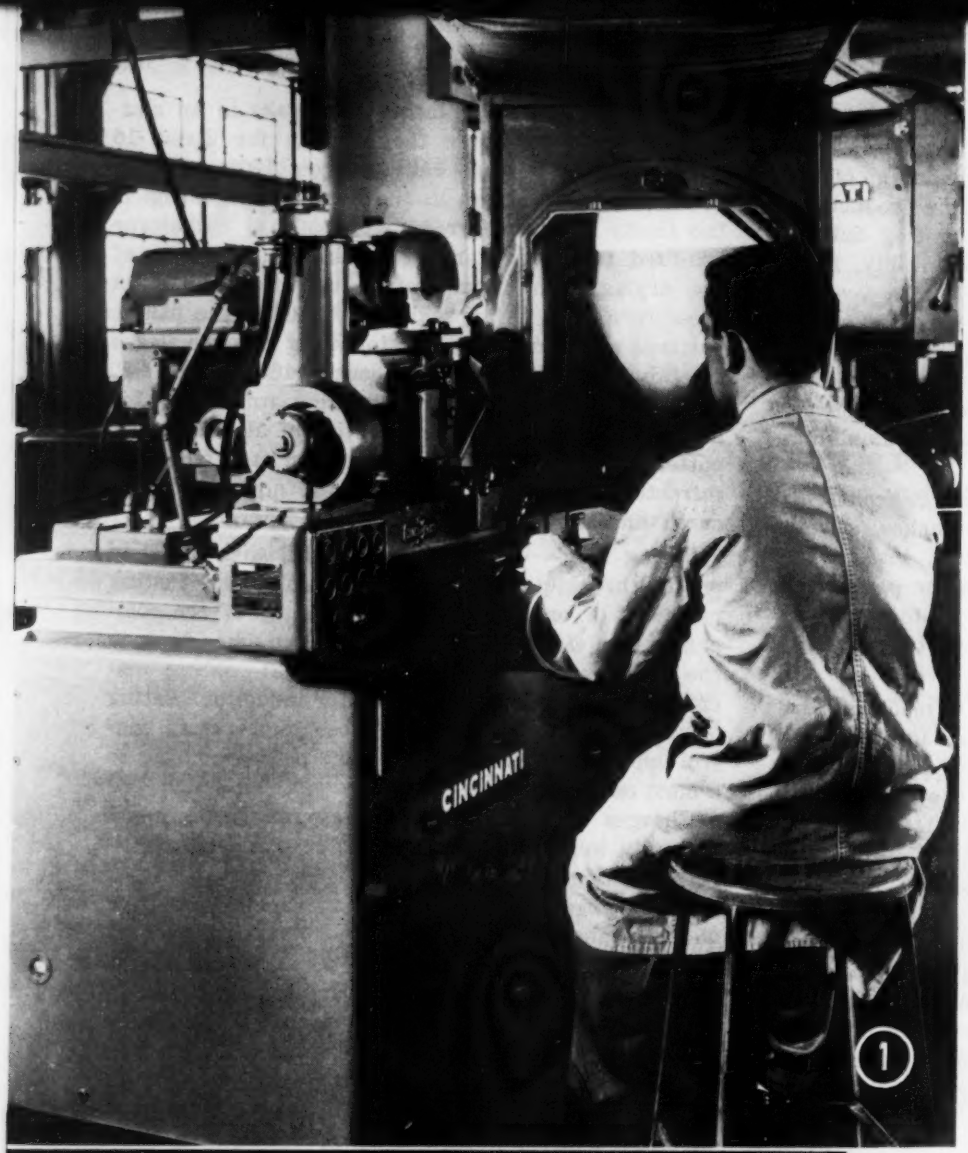


Fig. 1—Operations of grinding and checking are performed simultaneously on the Projecto-Form grinding machine

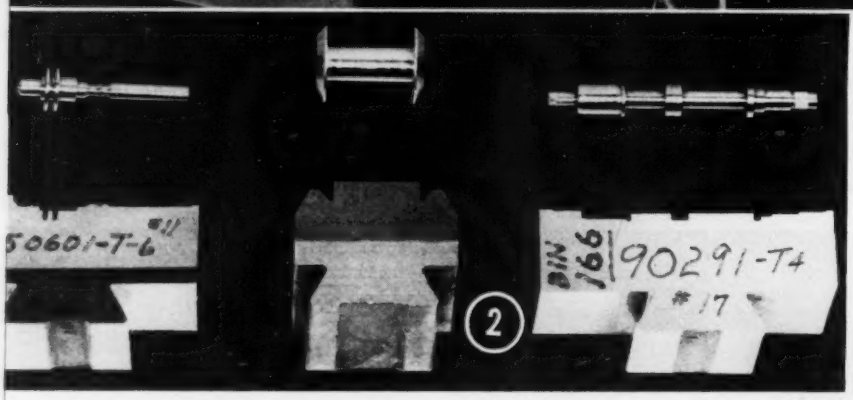
Fig. 2—(left) This part is 1.247-inch long, largest diameter is 0.310-inch. Form tool was ground in 2½ hours. (center) Grinding time on this job was reduced by 60 per cent. Large diameter 0.532-inch, length 0.775-inch. (right) Grinding time for this form tool was reduced from 10 hours to 2½ hours by the new method. Part is 1.926-inch long, largest diameter is 0.248-inch

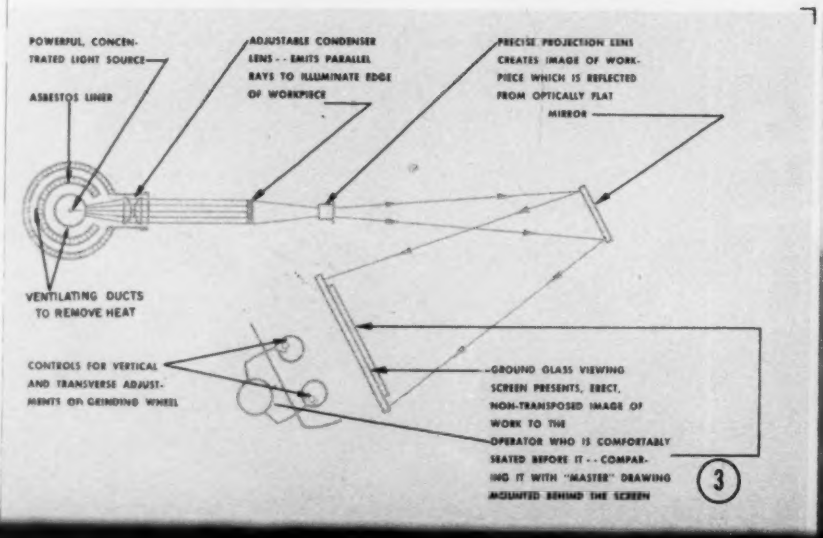
Fig. 3—Schematic drawing showing optical projection system

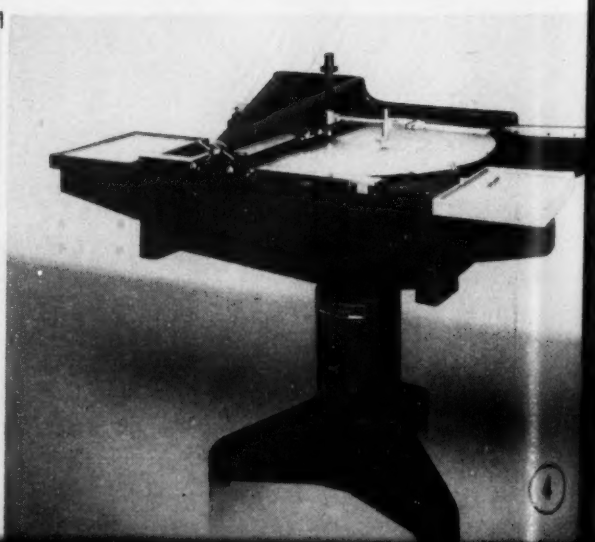
Fig. 4—Layout scribing machine provides means of making master drawings on a scale of 20 to 1 and accurate to 0.001-inch

Fig. 5—Entire contour of blanking punch for this part was ground by the new technique. Time was reduced by 68 per cent

Fig. 6—Grinding time on this hardened steel template was reduced by 72 per cent




POWERFUL, CONCENTRATED LIGHT SOURCE
ASBESTOS LINER
ADJUSTABLE CONDENSER LENS - - EMITS PARALLEL RAYS TO ILLUMINATE EDGE OF WORKPIECE
PRECISE PROJECTION LENS CREATES IMAGE OF WORKPIECE WHICH IS REFLECTED FROM OPTICALLY FLAT MIRROR
VENTILATING DUCTS TO REMOVE HEAT
CONTROLS FOR VERTICAL AND TRANSVERSE ADJUSTMENTS OF GRINDING WHEEL
GROUND GLASS VIEWING SCREEN PRESENTS, ERECT, NON-TRANSPOSED IMAGE OF WORK TO THE OPERATOR WHO IS COMFORTABLY SEATED BEFORE IT - - COMPARING IT WITH "MASTER" DRAWING MOUNTED BEHIND THE SCREEN
3



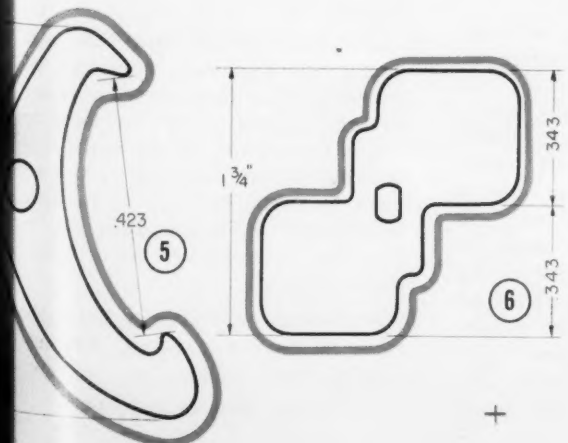
...AND CHECKING METHOD

. . . reduces over-all processing time on gages, form tools, small templates

Procedure devised by Cincinnati Milling Machine Co. not only gives a toolmaker complete control of vertical and transverse movements necessary to grind an accurate profile, but also supplies him with an optically enlarged view of the shape of the workpiece plus a master drawing made to the same ratio

TO ELIMINATE delays and reduce setup time when grinding small templates, gages, form tools and component parts of stamping, piercing or forming dies, a new grinding method incorporates an optical projection system in a grinding machine. With this procedure, devised by Cincinnati Milling Machine Co., Cincinnati, only one setup is required because the operations of grinding and checking are combined and performed simultaneously. Since an operation can be carried through from start to finish without interruption, the over-all time required for the job is considerably reduced. Time savings of 50 or 60 per cent are not unusual. Time required to grind the form tools illustrated in Fig. 2 illustrates this point. On some jobs the saving in time is even greater.

A toolmaker or diemaker, seated at a Projecto-Form grinding machine as shown in Fig. 1, not only has complete control of the vertical and transverse movements necessary to grind an accurate profile, but has immediately in front of him an optically enlarged (20 to 1 ratio) view of the shape of the workpiece plus a master drawing made to the same ratio. The workpiece and grinding wheel appear as solid black objects on the viewing screen while the desired shape of the work piece is outlined on the master drawing by sharp bright lines. The operator actually sees an enlarged picture of the surface of the workpiece and can continue to remove stock from a surface until the edge of the black image of the workpiece splits the corresponding line on the master drawing. A schematic drawing of the optical system is shown in Fig. 3.



Advantages of being able to see an enlarged view of the workpiece while the grinding operation progresses, are obvious. This is particularly true of small workpieces like the punch for the part shown in Fig. 5. The line in solid color indicates that the entire contour was ground.

Variety of work in the average tool and die shop usually includes making templates of many sizes and descriptions. Grinding small templates is another class of work well suited to the method as illustrated by the fact that the grinding time for the hardened template shown in Fig. 6 was reduced by 72 per cent.

Lamination dies are usually built up of a number of identical sections. When grinding workpieces requiring rotation, such as crush dresser rolls or circular form tools, the circular grinding attachment is used on the machine.

Master drawings are made on the layout scribing machine, Fig. 4. A glass plate coated with a tinted translucent gelatin emulsion is used. Lines are scribed by a carbide tipped stylus which cuts through the gelatin emulsion leaving an accurate sharp line. Rigid slide-ways guide the scriber holder; accurate positioning to 0.001-inch is assured by graduated scales equipped with verniers. For scribing arcs a trammel bar of the beam compass type is provided. Also, a microscope with a cross-hair reticule may be interchanged with the scriber in order to relocate over a line or to position over a center point.

Since the scribed lines are only 0.004-inch wide, the thickness of a line on the master drawing represents only 0.0002-inch on the workpiece as seen on the viewing screen of the grinder. It will be seen, therefore, that it is easy to reproduce the desired profile on a workpiece within close limits.

UNIVERSITY OF MICHIGAN LIBRARIES

Wiremakers Exchange Ideas on

CARBIDE DIE PRACTICE

Important operating data presented before a highly coordinated meeting in Chicago covered application of back pull in wire drawing, results that materialize by increasing bundle sizes, facts to be recognized in processing stainless steel wire and other shop practices

INTEREST in the 20th annual meeting of the Wire Association, LaSalle Hotel, Chicago, October 17-21, gained momentum from the opening session until the final research paper was presented. Over 400 were registered.

Next year's convention will be held at the Lord Baltimore Hotel, Baltimore, during the week of October 16. Regional meetings for 1950 are being planned for Chicago, San Francisco and Toronto.

At a symposium on tungsten carbide dies, which was one of the highlights of the convention, the following facts were brought out. The degree of polish on the die depends upon each mill practice. As rods go through the die, there is a tendency for the rod to turn slightly on its axis and thus produce a polish on the die that simply cannot be established by a machine. A 14 or 16-degree approach angle affords good production on high and low-carbon wire and at the same time eliminates the problem of stocking dies. Common practice in the United States is to run dies with no bearing.

Die-Life Increased—In copper practice it has been found that as the bearing of the die increases in length, the pull on the wire also increases. As the bearing and pull increase, the wire has a tendency to draw undersize. One operator pointed out that die life is decreased 60 per cent by using a 125 per cent bearing. Another wiremaker mentioned that at his mill maximum die life is obtained by using a 16-degree approach angle. Production tapers off when an 18-degree approach angle is employed and die life is exceptionally poor when a 20-degree angle is used. Consensus was to the effect that a 16-degree angle on a carbide die is the ideal angle under copper wire drawing practice.

Wide discussion centered around a paper entitled "Back Pull Wire Drawing" by D. Lewis and H. J. Godfrey, chief and assistant chief engineer, development engineering, respectively, John A. Roebling's Sons Co., Trenton, N. J. The paper described the experience of the company with a Marshall Richards back pull machine.

From a mechanical point of view the machine has a number of unique features:

1. Wire passes directly through die from block.
2. Block pull is adjustable to any required torque and after adjustment remains in constant ratio with the torque of the other blocks at all speeds.
3. Any draft from zero per cent up may be used on any block.

Split Torsions Reduced — The authors found that an increase in back pull on the machine reduced the percentage of split torsions. They presented charts to show that the temperature with high back pull was 30° F lower than with low back pull.

When drawing low-carbon steel wire without back pull, the amount of drafting per hole is limited by the breakage which occurs when the draft is too high. It was brought out that the draft may be within the range of 30 to 40 per cent without undue breakage.

When back pull is used the forward pull is increased causing breakage unless the draft is suitably restricted. Tests show that the maximum safe drafting with back pull is about 30 per cent per hole.

Discussion of this paper brought out diversified views concerning the advantages of this method of wire drawing. Some were of the opinion that the promise of back pull drawing has not been substantiated; others maintain that the method can be used for special purposes only. A few wiremakers felt that since the machine still was in its infancy, that more time should be allowed for additional operation before passing judgment on its performance.

Today there is no such thing as a humble day laborer and the hourly rate being paid makes everyone handling conscious. This was brought out by J. W. Galloway, plant engineer, B. Greening Wire Co., Ltd., Hamilton, Ont., in discussing "Size of Bundles in Handling Wire and Wire Products."

Grouped Machines Advocated—If we could double the size of our present package to and from the wire drawing machine, he stated, perhaps one operator could run twice the number of units. Mechanical handling equipment is available to do the job required. The author advocated grouping the rod and intermediate machines together for by so doing the operator is paid on the intermediates only. Thus the wire does not need to be weighed between the two operations. Overhead handling is such that the wire, as stripped from rod frames, can be taken direct to the pay-off stands back of the intermediates and loaded onto them ready for welding. These pay-off stands have the wire loaded on the back end where it can be welded to the bundle already there, without stopping the machine.

R. S. Brown, Rylands Brothers, Ltd., Warrington, England, in speaking on "Plastic Strain and Hysteresis in Drawn Steel Wire" mentioned that wire as-drawn possesses no elastic properties and therefore has no elastic limit. The speaker showed the unique ability of drawn wire to withstand the repeated application of combined bending and tensile stresses is due to its capacity for plastic creep associated with hysteresis behavior of a high order. Wires of high-tensile strength produced by hardening and tempering were shown to possess negligible creep characteristics and greatly reduced hysteresis and the speaker warned that such wires have proved to be unsuitable for use under conditions involving dynamic stresses.

Mr. Brown asserted that simple ageing and accelerated ageing by heating to a low temperature restores the elastic range almost completely.

Investigations indicate that high plastic and hysteresis properties are essential for a durable rope wire and as these properties are impaired by rise in temperature of the wire during drawing, future progress of the art must be along the line of complete suppression of temperature rise in the wire immediately as it leaves the drawing die.

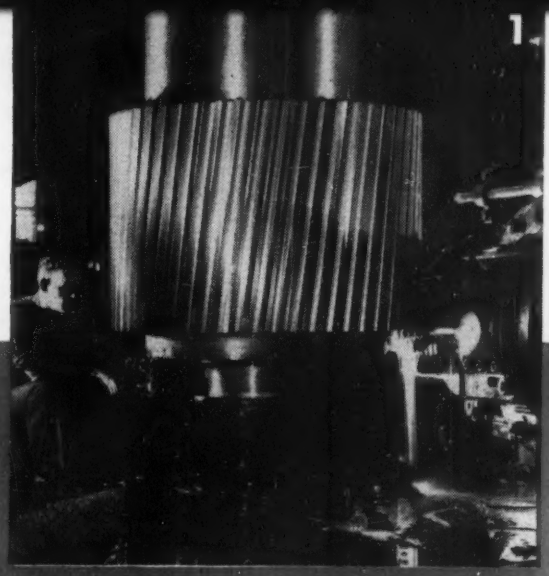
In rolling chromium nickel types from billets to rods, a generally higher temperature is employed

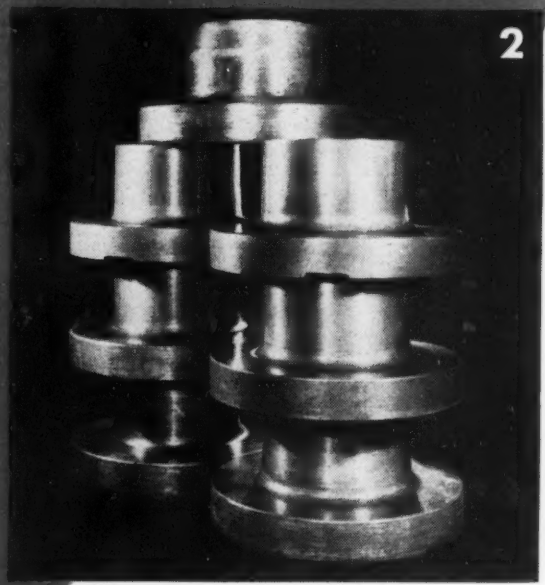
(*Please turn to Page* 146)

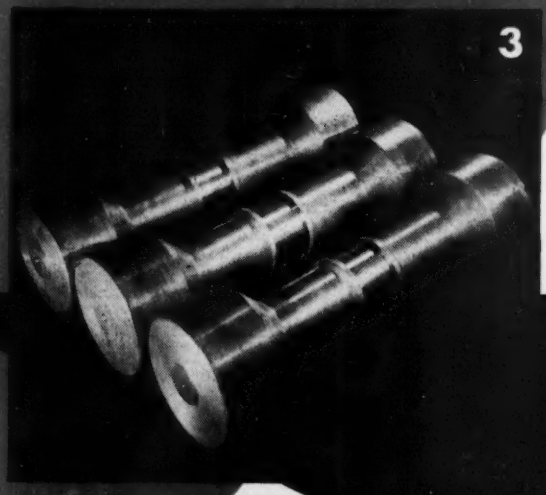
MESTA Forgings

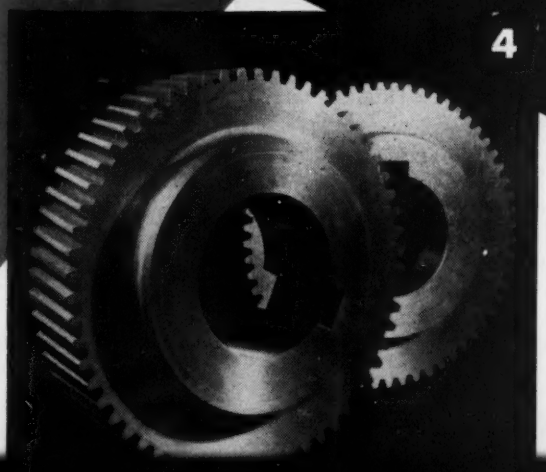
From the selection of raw materials to the accurately machined finished product, every step in the manufacture of Mesta forgings is under rigid control to assure consistent high quality. Mesta Forge Shops produce carbon and alloy steel forgings in all sizes, up to the largest used by industry.

Write for descriptive forging literature.









1 Forged steel single helical cut tooth pinion for vertical edging aluminum rolling mill.

2 Group of forged steel coupling halves.

3 Group of semifinished forged steel spindles for four-high continuous strip mill.

4 Forged steel gears for four-high skin pass mill feed reel.

MESTA MACHINE CO.
PITTSBURGH, PA.

UNIVERSITY OF MICHIGAN LIBRARIES

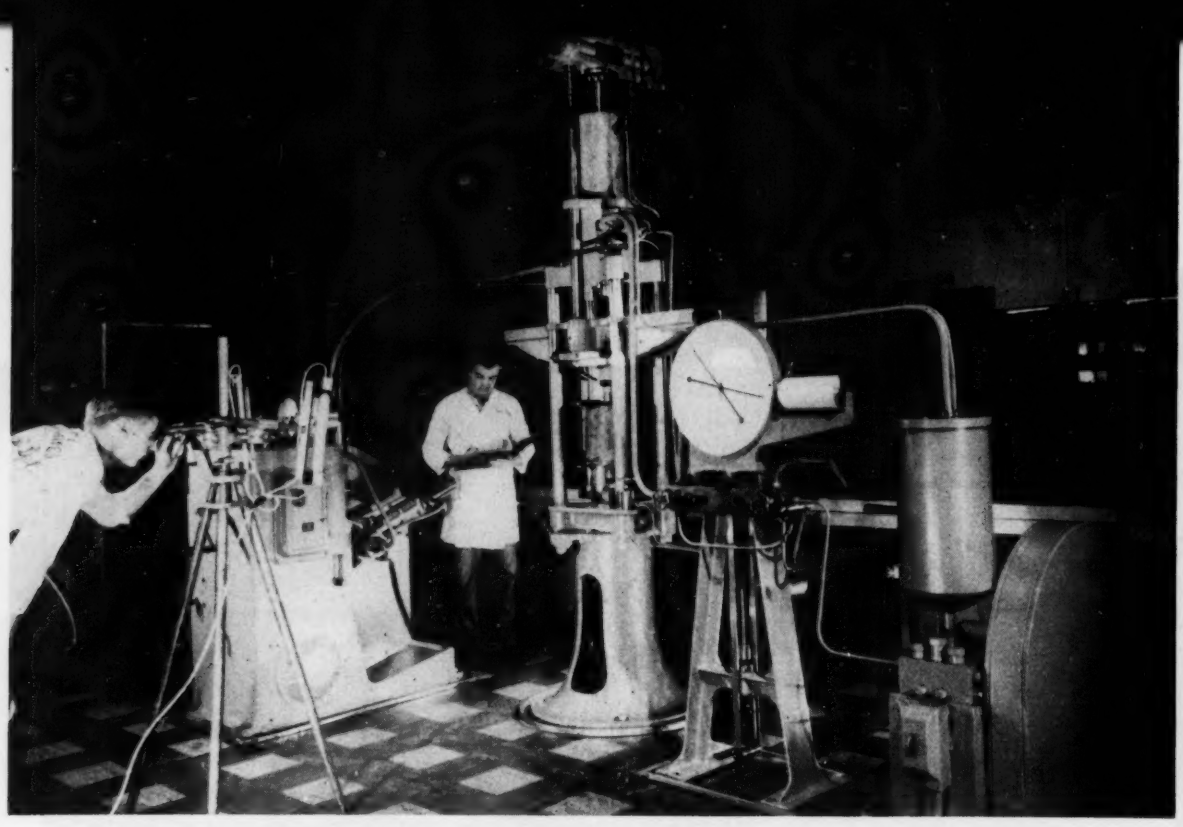


Fig. 1—Tensile properties of steel valves are determined with aid of this 72,000 pound capacity testing machine of Swiss design. Unit is equipped with an electric specimen heating furnace

New Laboratory Concentrates on

STEEL VALVE RESEARCH

NEWLY opened laboratory at the East Chicago, Ind., plant of Edward Valves Inc., which builds steel valves from ⅛ to 14-inch pipe size for power generation, petroleum and other industries, is believed to be the only one of its kind equipped exclusively for steel valve research. Besides facilities to determine characteristics of various cast or forged steel valves for elevated pressures and temperatures as high as 1800° F, or extremely low subzero temperatures, it includes equipment to guide development of new designs adapted to increasingly severe service conditions.

Fig. 2—Strength of valves at high temperatures is measured by conventional testing machines and also by creep and stress-to-rupture tests as shown here

Basis of selecting materials for steel valves revolves around the strength of the materials at both high and low temperatures, and the structural stability of steels used. Strength is influenced by service temperature in operation—and stability of steel structure produced by welding used in fabrication. For this work, the laboratory makes use of many specialized units to obtain data on tensile, fatigue, impact, hardness and stress properties.

To obtain tensile properties of steels, technicians here employ a testing machine of 72,000 pound capacity equipped with an electric specimen furnace. Elongation is measured by a mirror extensometer so increments as small as 0.00001-inch can be detected at both room and elevated temperatures. Impact strengths are measured in an impact tester of 120 foot-pound capacity.

Impact Tests—High temperature impact tests are conducted by heating bars separately in electric muffle furnaces. For subzero tests, the bars are precooled in an automatically controlled liquid bath cooled by introducing liquid nitrogen. Tests ranging from minus 300° F to plus 1200° F are considered common. Although fatigue strengths of materials are checked in rotating beam machines, fatigue tests of full size parts are made in a pulsation fatigue tester equipped with a pulsator of 40,000 pound capacity. In a few hours, valve parts such as seats, disks and stems can be subjected to repeated loading—equivalent to many years of hard usage.

Among the several hardness test-

THE MODERN ELECTRIC RESISTANCE

Michigan WELDED STEEL TUBING

A Quality Product

AT PLAY
AND AWAY
Michigan has kept Pace with product manufacturers in Helping to devise New application for tubing, whether for people at Play or Facilities of Convenience and Necessity on Land, Sea and in the Air.

ROUND

¼" to 4" O. D. 9 to 22 gauge

SQUARE-RECTANGULAR

½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

Our engineers will advise and give technical help in the selection of tubing best suited to your needs.

For 33 years manufacturers of thousands of different products have used Michigan Electric Resistance Welded Steel Tubing. This is proof of the utility and accuracy of Michigan tubing. It is available in round, square and rectangular shapes, a wide variety of sizes, to give uniform strength, weight, ductility, ID and OD, machinability and weldability. Can be formed or machined in your plant or come prefabricated by Michigan.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

33 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Drummond, McCall & Co., Ltd., Toronto, Canada.

UNIVERSITY OF MICHIGAN LIBRARIES

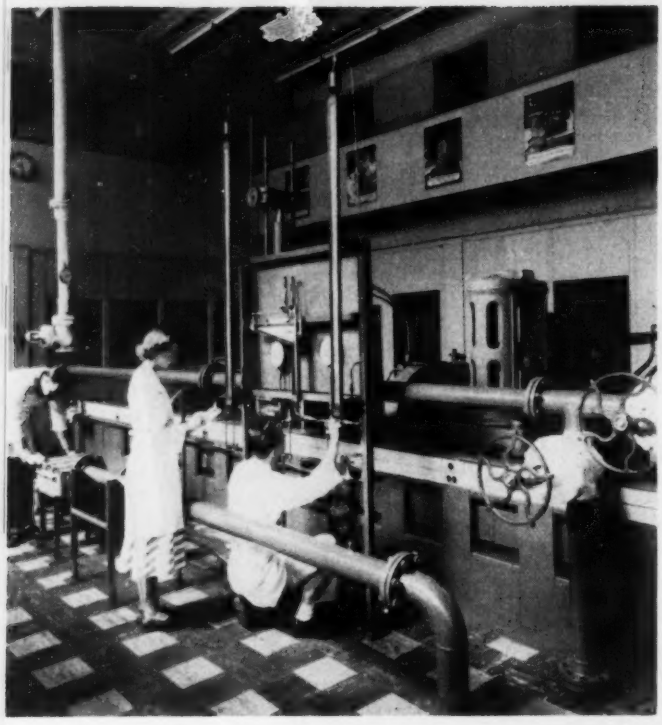


Fig. 3—This flow test stand designed by the company enables valves to be tested with 4000 cubic feet of air at 100 pounds per square inch. It is equipped with orifice meter for measuring quantity of flow and station for measuring pressure drop of valves

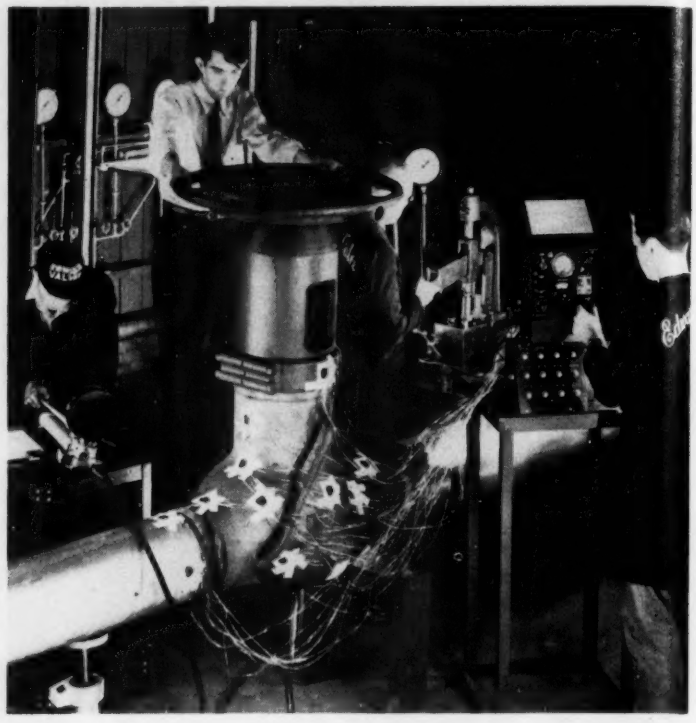


Fig. 4—In making stress analyses of valve parts both Stresscoat brittle lacquer and Baldwin Southwark SR-4 strain gage methods are used. As shown a multiple-point strain gage balancing unit, employed with the latter, facilitates measuring strains at a large number of points

ers employed in the laboratory is an Alpha Brinell unit of Swedish manufacture. This is used as the standard of hardness measurement on larger parts, and is provided with a furnace for making tests at elevated temperatures. An attachment employed with a metallurgical microscope facilitates hardness testing of individual grains of steel in studying structural components. Variety of other testers—Monotron, scleroscope, portable Brinell and Vickers units—enables technicians to check easily various valve materials regardless of size.

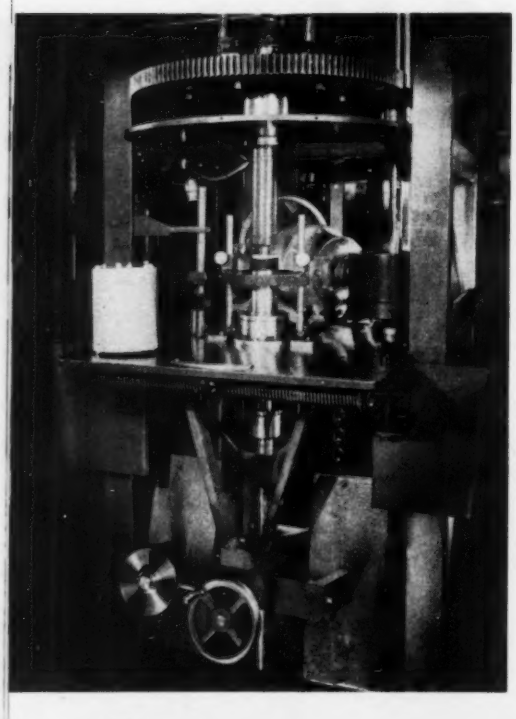


Fig. 5—Valve stem thread tester which operates up and down continuously

Strength at elevated temperature is measured not only with short time tests in a conventional tensile machine but also by creep and stress to rupture tests under constant load and high temperatures. One creep detecting machine, imported from Germany, records photographically the plastic deformation of the steel test bars as accurately as 1 micro inch.

Tests All Type Valves—Requirements of product design and testing lead to quite a number of more specialized machines developed particularly for valve use. For example, a flow stand designed and constructed by the company enables 4000 cubic feet of air at 100 pounds per square inch to be used for valve testing. Valves handled can either be full size units as large as 12 inches or plastic models which are varied readily to investigate effects of changed shapes or designs.

To obtain stress data for turning out suitable steel valves for high pressure-high temperature use, the laboratory makes use of both the Stresscoat brittle lacquer and Baldwin-Southwark SR-4 strain gage methods. With the latter, a multiple-point strain gage balancing unit is employed so strains at a large number of points may be measured with a single load of the test valve. Valves also are stressed up to yielding point by a pressure test at various temperatures. This is done by either hand-operated high-pressure pumps, or a special motor driven air intensifying unit. Assembly and operating stresses are duplicated by torque wrenches or application of wire resistance strain gages to actual loading members. Bending movements associated with pipe line installations are achieved by hydraulic jacks or power-operated hoists.

Study Thermal Gradients—As interpretation of the effect of stresses in steel valves is tied up very intimately with an accurate knowledge of the temperature distribution within each valve and its parts during usage, the temperature of the fluid passing a valve in use has only an indirect effect on the temperature of the operating handwheel. Thus a study

(*Please turn to Page* 150)

PHYSICS OF POWDER METALLURGY

. . . discussed at symposium

RECENT advances in solid-state physics were correlated with engineering approaches to problems in powder metallurgy at a recent 2-day symposium sponsored by the metallurgical laboratories of Sylvania Electric Products Inc., Bayside, N. Y. Leading American and European authorities gathered for the first time under commercial auspices to promote a better understanding of the mechanisms of sintering. Theories and mechanisms of sintering, self-diffusion, viscous flow, grain growth, nucleation, recrystallization and surface tension were among the subjects discussed in the 23 papers presented.

A joint paper by Walter E. Kingston, manager, Sylvania Metallurgical Laboratories and chairman of the symposium, and G. F. Huettig, head of the department of inorganic chemistry, University of Graz, Austria, keynoted the meeting with the observation that pure research into basic phenomena is a valuable aid to understanding the mechanism of sintering and the relation of the fabrication process to the properties of sintered materials. This paper, which surveyed the various phases of research in powder metallurgy, discussed a thermodynamic approach, methods of atom transport, kinetics of sintering, and the present state of the theory of sintering. The various stages of sintering were outlined, and emphasis placed on the signficance of changes in the compact occurring before densification.

Geometric adjustments were cited to explain these changes, in which the contact area between particles increases from a point contact as the void surface area decreases. The study of surface energetics was shown to be a significant contribution to the understanding of the sintering process. It was also pointed out that although there is still a divergence of opinion on some of the theoretical aspects of powder metallurgy, developments in recent years have served to provide a foundation for basic concepts.

Crystal Growth—Since the theory of sintering is concerned with the mechanisms of grain behavior, the papers on crystal growth, recrystallization, nucleation, and grain boundary movements sustained considerable interest. A new technique of studying crystal growth was described by A. Smekal, head of the department of physics of the University of Darmstadt, Germany, who used crystals of rock salt as a model in his experiments. Since the growth of ionic crystals can be directly observed under microscopic examination and new planes actually seen as they appear, NaCl crystals provide a convenient model for crystallographic studies of surface effects, rates of growth, and self-diffusion.

Two distinct mechanisms of crystal growth were observed: (a) At low temperatures, growth was bounded by cube planes, but (b) at high temperatures there was no connection with crystallographic planes. The latter mechanism is the same as that occurring in metal crystals where the rate of growth is governed by the supply of the material. Smekal also showed how self-diffusion was studied by means of electrical conductivity measurements and how these data were related to migration and "freezing" of holes in the crystal lattice.

A striking group of color photographs illustrating recrystallization and grain growth was presented by P. Beck of the University of Notre Dame. The observed directions of boundary migration were discussed, and it was shown that grain growth is related to the orientation of nuclei. The relationship of grain orientation to diffusion at a given grain boundary was discussed in a paper by R. Smoluchowski and M. R. Achter of Carnegie Institute of Technology. Data were presented on grain boundary diffusion of silver in copper. Rates of homogeneous nucleation and the effects of impurities and of the container wall were described in a paper by J. H. Hollomon and D. Turnbull of General Electric Co. Considerations of changes in physical properties with recrystallization were presented by M. Balicki of Polytechnic Institute of Brooklyn.

Properties of Metals — Although most sintering processes are accomplished at temperatures near the melting points of the metals used, most of the detailed studies of the properties of metals are performed at much lower temperatures. A paper by B. H. Alexander and G. C. Kuczynski of Sylvania Electric Products Inc. described an investigation of the characteristics of metals at high temperatures, under conditions of stress and dispersion that prevail during sintering. Possible types of flow mechanism which could lead to bonding of metallic particles were discussed, and it was shown from experimental results that volume diffusion flow is effective in bringing about a bond between copper particles up to 1070° C. In creep experiments on gold wire at 1050° C, the flow was found to be viscous at stresses lower than the critical value. At higher stresses the flow first occurred by slipping, but became viscous at longer times.

New techniques in the use of radioactive tracers in self-diffusion studies were described in a paper by M. Cohen, D. Bakalar, and F. S. Buffington, of Massachusetts Institute of Technology. They presented data on the self-diffusion rates in alpha and gamma iron. The diffusion process in the sintering of copper-gold compacts was discussed in a paper by Pol Duwez and C. B. Jordan. Sintering of $AuCu_3$ was discussed in relation to the solubility of copper in the ordered and disordered phases of AuCu at the lower temperatures of the sintering process.

Rate of Plastic Flow—A quantitative discussion of the laws by which surface tension and geometry determine the rates of plastic flow, evaporation and condensation, volume diffusion, and surface migration, was presented by Conyers Herring of Bell Telephone Laboratories. In the absence of externally applied stresses, the changes in shape of the welding together of small particles of a pure crystalline substance were assumed to be motivated by surface tension and effected by one or more of the above four processes. Methods were derived for computing volume diffusion currents by potential theory and for calculating the effect of grain boun-

(*Please turn to Page* 152)

UNIVERSITY OF MICHIGAN LIBRARIES

FLAME FABRICATING

Structural Steel

Straightening, forming and cleaning operations on heavy and complicated sections are greatly facilitated by correct utilization of oxyacetylene equipment

By F. H. DILL
Welding Engineer
American Bridge Co.
Ambridge, Pa.

SINCE the introduction of the oxyacetylene cutting torch and its companion, the welding torch, to the structural fabricating industry over 40 years ago, there has been ever increasing use of the oxyacetylene flame to perform old tasks more easily and to accomplish work beyond the reach of other tools. Local heating of parts for mechanical straightening or hot bending is a use that developed because it could save time.

Straightening complicated pieces and assemblies solely by local heating, and the corollary process of forming or cambering steel parts by local heating, save time and cost, and accomplish results that could not be attained otherwise without large and costly machinery.

An early and still important use of the oxyacetylene flame in structural work is for heating steel to visible red heat so it can be straightened with hammer blows. This permits parts, such as connection angles and light flanges that stand out from large members and are often bent in handling, to be straightened without moving the piece to a machine. It saves both time and expense. A similar application appears in the final setting to accurate dimensions of pieces that have been bent in presses.

Local Heating—A more recent use of the oxyacetylene flame is for locally heating steel to hot bending temperatures preparatory to bending in a press or by other mechanical means. This application, which is possible where there is a plentiful supply of low cost acetylene, pits the rapid heating of the oxyacetylene flame against the slower more soaking heat of less expensive fuels burned in torches or in open top, slot-type furnaces. Heating time is reduced, sharper bending and more accurate location of bends can be attained. Heating time is reduced directly by rapid heating rate of the intense oxyacetylene flame, but there is further saving of time and fuel because a short heating time minimizes the loss of heat into contiguous metal that it is not necessary to heat.

Sharper bending and more accurate location of bends result from the ability to heat only the metal which must be deformed in bending. It is very important when using the oxyacetylene flame to heat sufficient metal to permit bending without excessive reduction in the thickness and width of the piece being bent. For unsymmetrical sections this demands heating of triangular or trapezoidal shaped areas.

Another very important precaution is to avoid heating to temperatures of 400 to 700° F any steel that has been severely cold-worked, as by cold-forming, punching, or shearing. Inattention to this precaution can allow the development of strain-aging and consequent brittle fracture of the steel. An example of this can be cited from the records of a large fabricating shop in the fracture of several 8 x 8 x 1⅛-inch flange angles for girders. The angles were punched and then curved by cold-forming before they were torch-heated for making a sharp angular bend. They broke in brittle manner through punched holes about a foot from the center of the bend while they were being fitted and assembled with the web and other parts of the girders.

Straightening and Forming—Wide acceptance of flame-cutting and welding as practical methods for fabricating structures has provided great impetus to the use of the oxyacetylene flame for straightening and forming steel. When rivets are used for connecting the elements of a structure there is seldom need for straightening or fairing completed members or assemblies. Flame-cutting and welding, however, both involve intense local heating of the steel and inherently cause shrinkage of the metal. It is natural to fight fire with fire and the intense oxyacetylene flame has come into use for creating balancing shrinkages that produce straight members and fair structures.

During the wartime construction of ships the fairing or flattening of plating by local heating received much attention. Checkerboard patterns of spots and zebra-like stripes were common sights in the shipyards. They displayed the shipbuilders' solution to the problem of eliminating the buckles that formed in rectangular panels of thin plating that had been shrunk at the boundaries of the panel by the welding which attached the plating to the skeleton of the ship. Heating spots about an inch in diameter to visible red heat on a checkerboard pattern in the buckled panels created an accumulation of small shrinkages which, in total, equalled the weld shrinkage around the borders of the panel and drew it flat. Some shipyards preferred lines of heat to rows of spots and some yards used both. Often the cooling of the heated metal was accelerated by directing small jets of water or air-water sprays against it to speed the work and to increase the shrinkage of each spot. In all of the work, however, the man using the torch had to judge the "temper" of the buckle and skillfully fit the amount and location of heating and accelerated cooling to the individual conditions of each panel.

Fabricating Large Structures—In the fabrication of large structures and structural members by welding there are often detail or overall distortions from the dimensions that the completed pieces are required to have. The pieces are usually too bulky to fit into presses for correction of their dimensions and many of them are beyond the reach or capacity of mechanical methods of straightening. Experience indicates that heating to produce shrinkage along lines parallel to and opposite to the welds permits the necessary cor-

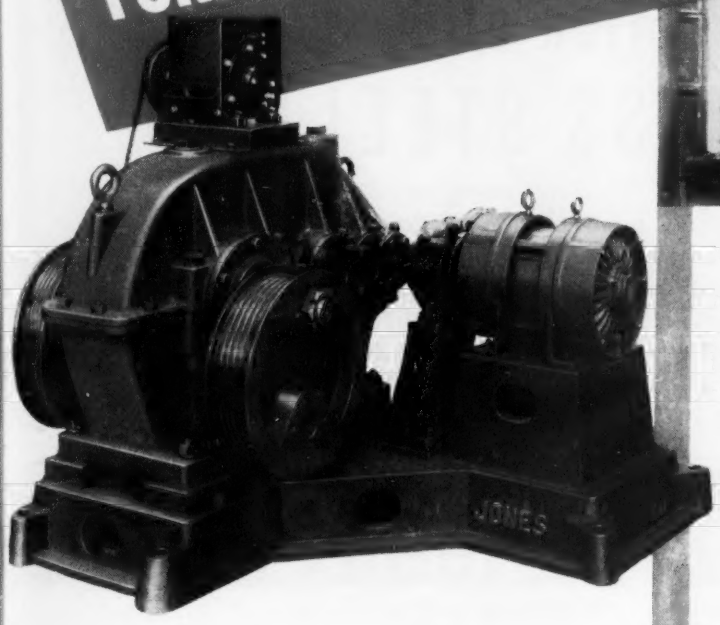
(*Please turn to Page* 160)

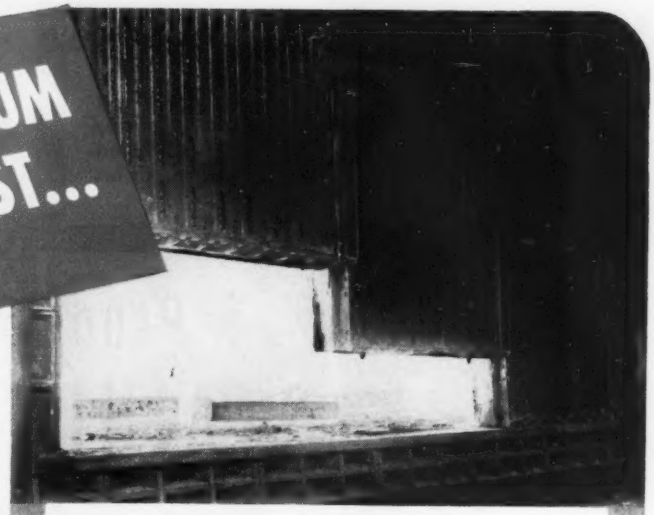
Specifications that define flame-cleaning as a unique process involving the following four separate operations were adopted by the American Institute of Steel Construction so the process can be distinguished from descaling processes and can be held to accomplishment of its intended results in commercial use:

1. Oil, grease and similar materials are to be removed with solvents.
2. Surfaces of steel are to be cleaned and dehydrated by the passage of the special oxyacetylene flames. (This operation drives absorbed moisture from the surfaces and also breaks away partly loosened mill scale and rust.)
3. Surfaces are to be wire-brushed and then swept with soft brushes to remove loosened scale, dirt and dust.
4. Paint is to be applied promptly and while the temperature of the steel is still above that of the surrounding atmosphere.

From data presented by the author before the 1949 annual meeting, International Acetylene Association, Pittsburgh.

JONES ECCENTRIC DRUM FURNACE DOOR HOIST...





JONES ECCENTRIC DRUM FURNACE DOOR HOIST showing the two eccentric winding drums mounted on opposite ends of the slow speed shaft. Opening and closing take place on the short radius of the eccentric so minimum motor torque is required for starting. Furthermore there is practically zero impact when the door starts to open and when finally closing, as a protection to the refractory material. Electric brake is located between the motor and hoist and the limit switch is located on top of hoist. Speed reduction is through the Jones triple herringbone reducer unit.

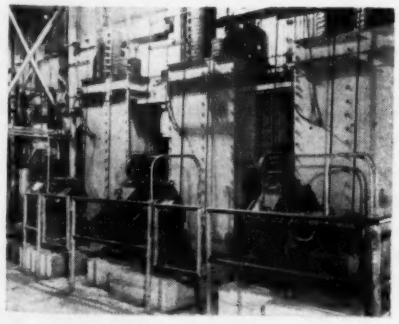
THE JONES ECCENTRIC DRUM FURNACE DOOR HOIST shown was developed when it was found necessary to eliminate all interior door jambs on the **AMSLER MORTON CORPORATION** recuperative plate mill furnace. The large plate mill ingots required wide doors and **FRAZIER-SIMPLEX, INC.** "Tilt-Lift" all-door furnace front walls were selected for this purpose. Since each furnace, of the installation illustrated here, has six consecutive doors and no front wall and each door weighs 8500 lbs. (counter weighted about 6600 lbs.), it can easily be appreciated that the door hoist came in for the most careful engineering study. Three consecutive doors on each side of the divided furnace provide an opening 21 ft. long in each furnace.

THE JONES ECCENTRIC DRUM TYPE HOISTS, developed to solve this door opening problem, have now been in operation several years and have provided the excellent service that has come to be taken for granted by the users of Jones transmission products.

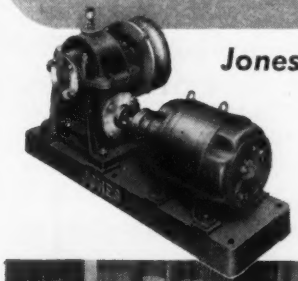
Door hoists of this, and other types, are built by Jones as complete units with motor included, if desired, or with a base to take standard motor as supplied by purchaser.

If you have a door handling problem, the Jones engineering department will be pleased to make a recommendation covering a unit for it.

W. A. JONES FOUNDRY & MACHINE CO.
4437 Roosevelt Rd., Chicago 24, Ill.

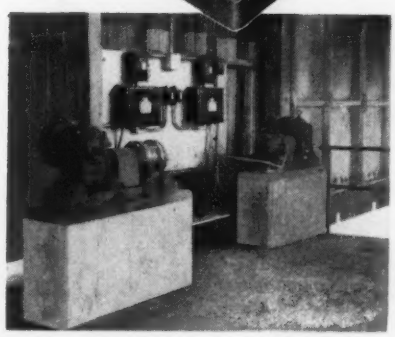


Rear view of the furnace showing three of the six Jones eccentric drum type furnace hoists and the door counter weights.



Jones "Slipper type" Hoists for small furnace or mill building doors.

This Jones door hoist is built in several ratings and in almost any convenient arrangement of sheaves and cables. No limit switches of any kind are required with this unit. A bronze ring on the winding drum slips to take care of overwinding.



The two Jones door hoists shown at the left are installed for opening and closing mill building doors.

Since 1890

Jones

In the Service of Industry

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS
PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

UNIVERSITY OF MICHIGAN LIBRARIES

FUNDAMENTALS OF STEELMAKING

NUMBER **15** OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

By B. H. DeLONG
Vice President and Technical Director
Carpenter Steel Co.
Reading, Pa.

Production of STAINLESS STEEL

The author continues his discussion of stainless steels presenting information regarding types and causes of corrosion encountered in service. These steels are broken down into three groups and presented in tabular form for quick reference

PART II

TO COMBAT the numerous acids and other corroding media, an economical choice must be made from the expensive noble metals, gold, platinum, silver, etc., and the more common metals such as tin, lead, stainless steel and iron. Each of these meet the requirements of physical and corrosion properties to serve in certain definite applications.

Degree of corrosion which can be tolerated may be roughly divided in three classes: 1—Conditions in which color, taste or odor of the final product is of most importance as encountered in the food, beverage, dairy, pure chemical and other industries; and the metals used must be corrosion resistant to the highest degree. 2—Parts for display or ornamental purposes, where surface appearance of the finished part is of most importance and freedom from discoloration is vital. This will, in most cases, involve the use of metals with a lesser degree of corrosion resistance than indicated in the previous class. 3—Parts used in industry, which must remain physically intact over an economized period of service operation, and in which the rate of corrosion and the life of the assembly are of most interest. This obviously allows, in some cases, the use of metals with a lesser degree of corrosion resistance than classes 1 or 2 above. Stainless steel, in its many ramifications of alloy content which impart varying degrees of corrosion resistance and physical properties, has proved to be an engineering tool that meets the wide variety of corrosion outlined above.

Some types of corrosion which may be encountered in the use of stainless steels are: Intergranular corrosion, galvanic corrosion, atmospheric corrosion, pitting, and stress corrosion. The aspects of these types and precautions for avoiding their occurrence will now be described.

Intergranular corrosion of stainless steels is confined solely to the nonmagnetic chrome-nickel types (304, 309S, 310, 316, 317)—see Table I. Briefly, this is caused by a transformation of the austenitic structure at the grain boundaries when the alloys are heated to temperatures between 800 to 1500°F, or are slowly cooled from higher temperatures through this range. Under these conditions, the transformed grain boundary areas are subject to attack under some conditions of moderate or severe service. For example, in the processes of welding there is a "transformation zone" in proximity to the weld. This area is more subject to attack from intergranular corrosion than either the weld metal itself or the balance of the assembly.

Such difficulty can be avoided by two procedures: 1—By giving the welded assembly a heat treatment

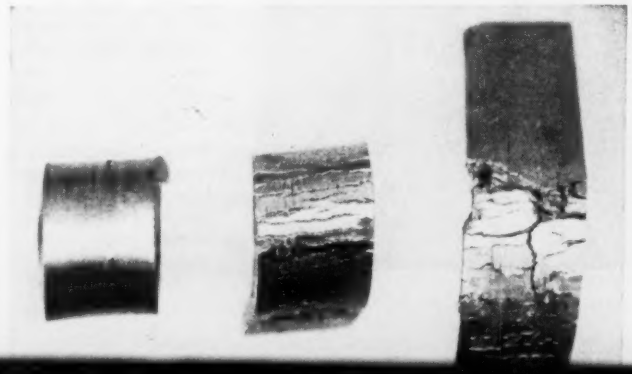
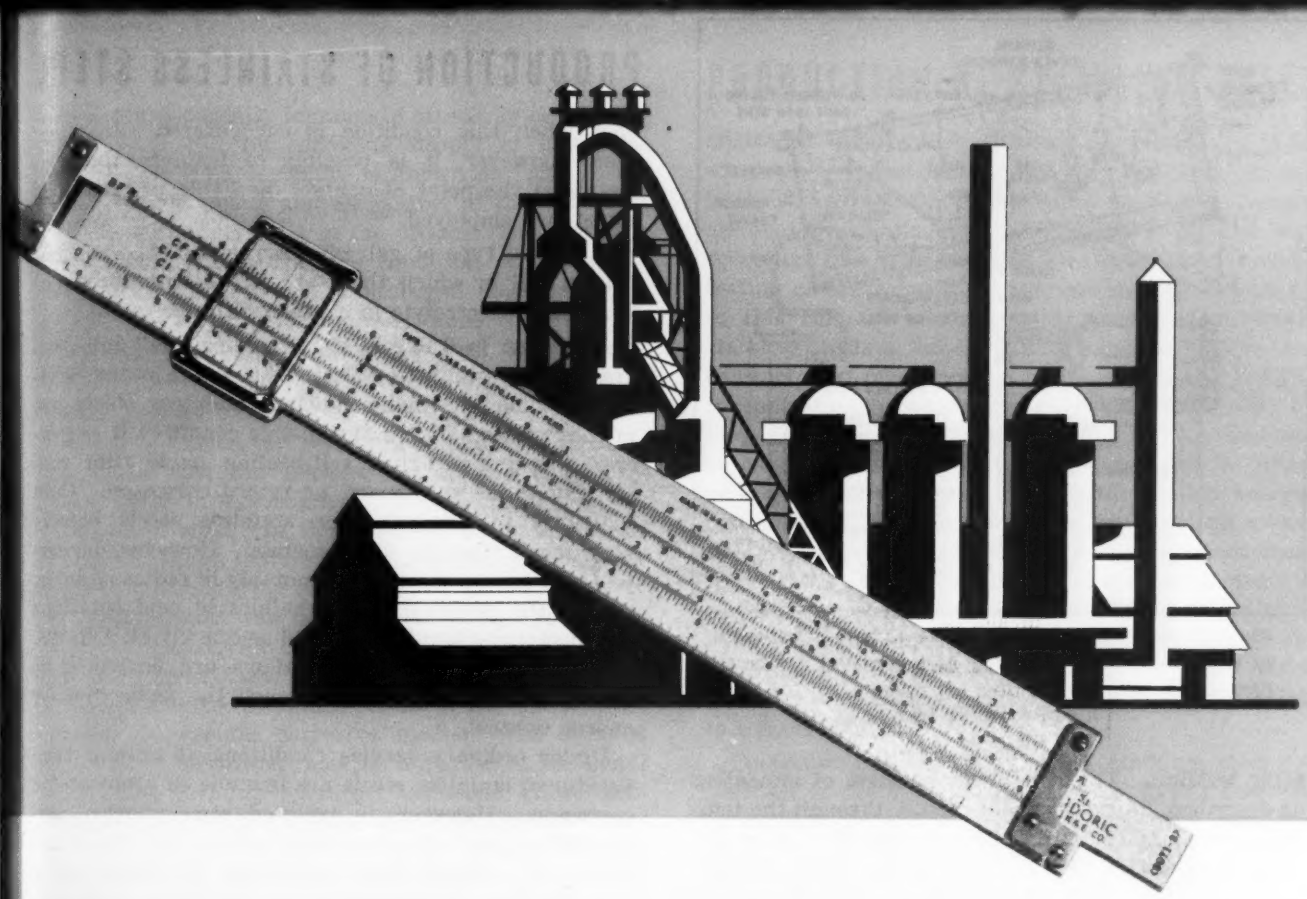


Fig. 9—Intergranular corrosion of type 304 austenitic chrome-nickel stainless steel as emphasized by the copper sulphate test. Specimen on left was properly annealed by water quenching from 2000 degrees F and shows no cracking when bent. Middle specimen shows effect of test on piece annealed properly but then held for one hour at 1100 degrees F. Note cracks which developed on bending. Specimen at right was heated for one hour at 1200 degrees F and is still worse



HOW BIG SHOULD A BLAST FURNACE BE?

BIG enough to fit your market *profitably*. The exact size depends on a great many factors—source and quality of raw materials, geographical location of your plant, location and extent of your market, freight rates, and future economic trends, among others.

McKee can give you the answer in feet and inches—in size and capacity—because McKee engineering takes into consideration *all* the factors influencing plant design and construction—including dollars and cents.

In 45 years of building iron and steel plants all over the world, McKee has built more blast furnaces than any other single organization.

WHAT STEEL MEN WILL TELL YOU ABOUT McKEE ENGINEERING:

Wherever iron and steel are made you'll find McKee recognized as the acknowledged leaders in blast furnace and steel plant design and construction.

McKee engineering services cover facilities for every step of iron and steel production from preparation of raw materials to finished steel.

McKee service is prompt. That's important to the iron and steel producer because it means capital investment is transformed into a profit-producing plant in the shortest possible time.

From Europe to Australia . . . from Canada to Brazil . . . steel men will tell you: *"McKee Engineering means assured results".*

ARTHUR G. McKEE & COMPANY

SIGN, ENGINEERING AND CONSTRUCTION FOR THE IRON AND STEEL AND PETROLEUM REFINING INDUSTRIES

ENGINEERS AND CONTRACTORS • ESTABLISHED 1905
2300 CHESTER AVENUE, CLEVELAND
30 Rockefeller Plaza, New York, N. Y.

& Steel Division of Arthur G. McKee & Company is represented in England by the McKee Iron & Steel Division of HEAD WRIGHTSON & CO. LTD.

UNIVERSITY OF MICHIGAN LIBRARIES

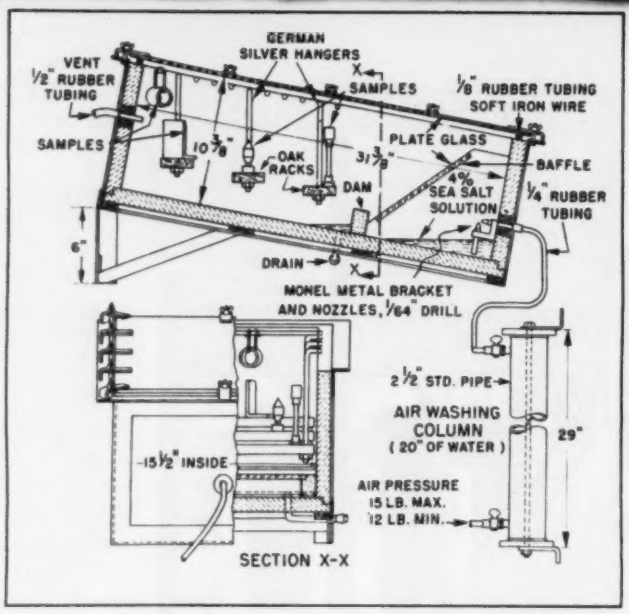


Fig. 10—Salt spray apparatus for testing resistance of stainless steels to rusting in 4 per cent sea salt. Specimens are left in this corrosive fog for 100 hours more or less

after welding. This treatment consists of annealing as described, in order to cool rapidly through the temperature range of 1500 to 800°F, depending upon the exact composition of the alloy. 2—By using chrome-nickel stainless steels that contain columbium or titanium. The columbium content is approximately ten times the carbon content and the titanium usually five times the carbon content. For continuous service in the temperature range of 800 to 1500°F, these "stabilized steels" are recommended.

To test for susceptibility to intergranular corrosion the copper sulphate or Strauss tests are commonly used. In this test the specimen, generally in the form of strip, is sensitized by welding, or artifically by heating to 900 to 1300°F, generally 1250°F, and then immersing in cupric sulphate for seventy-two hours. (3 or 10 per cent copper sulphate plus 10 per cent sulphuric acid.) The specimen is then bent 180 degrees around a pin whose diameter is equal to the thickness of the specimen as shown in Fig. 9. Some sensitized steels when submitted to this test actually granulate and fall apart; others lose their metallic ring when struck.

Galvanic corrosion is common to all metals. This is brought about when two dissimilar metals are in contact in a liquid capable of carrying an electric current. This includes practically all aqueous solutions. Under these conditions, an electric current is set up through the solution and tends to accelerate the corrosion of one of the metals and protect the other. For example, where both copper or copper alloys and stainless steel are in intimate contact in a solution of salt water, the current will tend to accelerate the attack upon the stainless steel portion and lessen the attack upon the copper alloys. In general, the corrosion resistance of stainless steel is lessened when in contact with lead, nickel, copper, copper alloys or graphite. On the other hand, it is improved at the expense of the other metal when in contact with iron, steel, aluminum, zinc or cadmium. The solution of this problem is using, so far as possible, metals of the same composition for complete assemblies when this condition is encountered. In some cases, however, it is possible to insulate the two metals at the point of contact, and this procedure is sometimes employed.

A related type of galvanic corrosion is the concentration cell in which there are two different concentrations of electrolyte in contact with one metal.

As shown in Table I, stainless steels fall into two groups, one designated "active" and the other "passive". Under normal conditions stainless steels are in the "passive state", and in this condition it is generally assumed that a self-healing oxide film continually forms to prevent or retard corrosion. Consequently in this condition stainless steels behave very much like the noble metals. However, in certain corrosive environments, notably in reducing acids, and in the presence of the halides in acid solutions this protective film is destroyed as quickly as it forms. Under these conditions the alloys are described as "active" and will behave in much the same manner as iron or steel.

Under ordinary service conditions at normal temperatures, stainless steels are immune to atmospheric corrosion. However, in polluted atmospheres—particularly in hot climates—corrosion is sometimes encountered. Under these conditions, the most corrosion resistant of stainless steels should be employed. Alloys containing chromium, nickel and molybdenum (types 316 or 317) are particularly recommended. In atmospheres at elevated temperatures, scaling may be encountered. Stainless steels have a much lower rate of scale formation than ordinary steels. The degree of scaling at a given temperature depends upon the exact composition of stainless steels employed and composition of the atmosphere to which the metal is exposed. In a general way, the higher the chromium content, the greater the degree of scale resistance. It has been found by experience that repeated heating and cooling cycles are much more damaging than continuous heating. In applying the chromium-nickel stainless alloys (types 304, 309S, 310, 316 and 317) to high temperature service, the problem of intergranular corrosion described above should be taken into consideration.

Under certain conditions of service, stainless steels

TABLE I

Galvanic Series of Metals & Alloys
Corroded End (Anodic, or Least Noble)

Magnesium
Magnesium Alloys
Zinc
Aluminum
Cadmium
Steel or Iron
Cast Iron
Chromium-Iron (active)
18-8 Chromium-Nickel-Iron (active)
18-8-3 Chromium-Nickel-Molybdenum
Stainless No. 20 Alloy
Lead-Tin Solders
Lead
Tin
Nickel (active)
Brasses
Copper
Bronzes
Copper-Nickel Alloys
Silver Solder
Nickel (passive)
Chromium-Iron (passive)
18-8 Chromium-Nickel-Iron (passive)
18-8-3 Chromium-Nickel-Iron-Molybdenum (passive)
Stainless No. 20 Alloy
Silver
Graphite
Gold
Platinum
Protected end (Cathodic, or most noble)

which are apparently immune to attack by certain solutions will fail by corroding deeply in individual spots. This type of failure is known as "pit" corrosion. All the causes and correctives of this condition are not well understood at the present time. In general, the answer when this condition occurs would indicate the selection of a stainless steel having a higher degree of corrosion resistance than that in which the pitting has been encountered. Molybdenum bearing grades, namely, 316 and 317 are less susceptible to pitting.

Stress corrosion or "season cracking" is commonly associated with the brasses, but is also frequently encountered in nonmagnetic chromium-nickel types of stainless steel. In this type corrosion, the metal cracks as though it were brittle and there may appear to be no accompanying corrosion. In the case of brass, the phenomenon was demonstrated long ago by the cracking of cartridge cases after they had been stored away for some time. It has been ascertained that failure is due to internal stresses in the metal when exposed to certain corrosive media. The stresses which must be present may be imparted to the metal during the forming operation, as when brass cartridge cases are cold formed from a flat piece of brass; or the stress may be in the metal while it is being assembled such as when bent or carrying a load in service. Obviously one of the best ways to minimize stress corrosion is to use fully annealed metal, and this, in the case of the nonmagnetic chromium-nickel steels, consists of fast cooling after heating to 1850 to 2100°F.

Some factors that influence corrosion, other than composition of the metal and corrodent itself, are as follows: 1—The presence of impurities in the corrosive medium. Some impurities act as inhibitors and slow down the corrosion action. Other impurities act as accelerators and increase the corrosion rate. Inasmuch as pure chemicals or solutions are seldom encountered in commercial work, the presence of even minor percentages of impurities is of most importance and should be considered when using published corrosion tables. 2—The temperature of the corrodent. As a rule, the degree of corrosion increases with increase in temperature. There are numerous cases where metals satisfactory for cold solutions are entirely unsuitable for these same solutions at more elevated temperatures. 3—While in a general way corrosion rate will increase with increasing concentration of the corrodent, there are notable exceptions to this rule. For instance the behavior of certain stainless steels in sulphuric acid solutions is such that the corrosion rate increases but slowly up to a definite concentration, at which point the rate rises rapidly up to a maximum, and decreases with further increase in concentration. It is therefore not safe to interpolate corrosion data as related to solution concentration. 4—The degree of aeration to which a corrodent is exposed. Liquids kept in closed containers from which air or a circulation of air is excluded will cause different degrees of corrosion than these same liquids when freely exposed to atmosphere. This applies also to the presence of atmospheric gases which may sometimes change corrosive behavior of metals to a marked degree.

Corrosion resisting qualities of stainless steel are inherent in the analysis of the metal itself; however, contamination of the surface by adhering rust and scale will have a deleterious effect. For this reason, it is essentially necessary that all scale resulting from welding, or heating to elevated temperatures, be completely removed, and parts be kept clean while in service. A very high degree of purity and freedom from contamination is necessary in food handling and pure chemical industries.

There is at present no satisfactory method of forecasting accurately the behavior of stainless steels in a given set of corrosive conditions other than actual service tests. However, a very useful qualitative test for stainless steel or other materials is described in the proceedings of the American Society for Testing Materials, Vol. 33, 1933, page 178. As described, this applies only to tests for stainless steels in boiling 65 per cent nitric acid, but may be equally well applied to any other corrosive liquid. The test consists essentially of determining the loss in weight of a prepared specimen for each of five successive 48-hour

TABLE II
AISI CLASSIFICATION OF STAINLESS STEELS
Chemical Composition, per cent

Type Number	C	Mn Max.	Si Max.	P Max.	S Max.	Cr	Ni	Other Elements
301	Over 0.08/0.20	2.00	1.00	0.040	0.030	16.00/18.00	6.00/8.00	.....
302	Over 0.08/0.20	2.00	1.00	0.040	0.030	17.00/19.00	8.00/10.00	.....
302-B	Over 0.08/0.20	2.00	2.00/3.00	0.040	0.030	17.00/19.00	8.00/10.00	.....
303	0.15 Max.	2.00	1.00	....	....	17.00/19.00	8.00/10.00	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
304	0.08 Max.	2.00	1.00	0.040	0.030	18.00/20.00	8.00/11.00	.....
305	0.12 Max.	2.00	1.00	0.040	0.030	17.00/19.00	10.00/13.00	.....
308	0.08 Max.	2.00	1.00	0.040	0.030	19.00/21.00	10.00/12.00	.....
309	0.20 Max.	2.00	1.00	0.040	0.030	22.00/24.00	12.00/15.00	.....
310	0.25 Max.	2.00	1.50	0.040	0.030	24.00/26.00	19.00/22.00	.....
314	0.25 Max.	2.00	1.5/3.0	0.040	0.030	23.00/26.00	19.00/22.00	.....
316	0.10 Max.	2.00	1.00	0.040	0.030	16.00/18.00	10.00/14.00	Mo 2.00/3.00
317	0.10 Max.	2.00	1.00	0.040	0.030	18.00/20.00	11.00/14.00	Mo 3.00/4.00
321	0.08 Max.	2.00	1.00	0.040	0.030	17.00/19.00	8.00/11.00	Ti 5xC min.
347	0.08 Max.	2.00	1.00	0.040	0.030	17.00/19.00	9.00/12.00	Cb 10xC min.
403	0.15 Max.	1.00	0.50	0.040	0.030	11.50/13.00	.....	Turbine Quality
405	0.08 Max.	1.00	1.00	0.040	0.030	11.50/13.50	.....	Al 0.10/0.30
410	0.15 Max.	1.00	1.00	0.040	0.030	11.50/13.50	.....	.....
414	0.15 Max.	1.00	1.00	0.040	0.030	11.50/13.50	1.25/2.50	.....
416	0.15 Max.	1.25	1.00	....	....	12.00/14.00	.....	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
420	Over 0.15	1.00	1.00	0.040	0.030	12.00/14.00	.....	.....
430	0.12 Max.	1.00	1.00	0.040	0.030	14.00/18.00	.....	.....
430-F	0.12 Max.	1.25	1.00	....	....	14.00/18.00	.....	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
431	0.20 Max.	1.00	1.00	0.040	0.030	15.00/17.00	1.25/2.50	.....
440-A	0.60/0.75	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
440-B	0.75/0.95	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
440-C	0.95/1.20	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
446	0.35 Max.	1.50	1.00	0.040	0.030	23.00/27.00	.....	N_2 0.25 Max.

UNIVERSITY OF MICHIGAN LIBRARIES

periods of immersion. In the case of exposure to boiling liquids, the test is carried out under reflux condensers. Loss in weight encountered by the metal under test is computed by a factor to inches penetration per month or mils per year. Consistent values which may be readily reproduced are obtained and these values will bear a general relation to the expected service life of fabricated equipment. However, it is often difficult to reproduce exact performance conditions in laboratory tests of this type, and absolutely accurate forecasts of equipment life could not be computed by this method. As a guide, S. L. Hoyt[1] has classified suitability to corrosion rate as follows:

A. Fully resistant ..... less than 4 mils per year
B. Satisfactorily resistant ..... 4 to 42 mils per year
C. Fairly resistant ..... 42 to 120 mils per year
D. Slightly resistant ..... 120 to 420 mils per year
E. Not resistant ..... over 420 mils per year

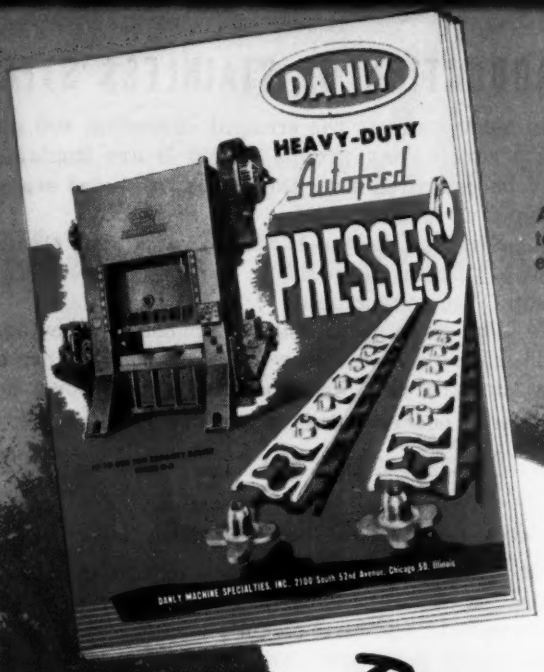
Another test used to evaluate stainless steels is the "salt spray test". This test was originally designed

TABLE III

THE A-B-C OF CORROSION AND HEAT RESISTING STEELS

Arranged by F. R. Palmer, Carpenter Steel Co.

Group A (Martensitic) *Straight Chromium; Hardenable*	Group B (Ferritic) *Straight Chromium: Non-Hardenable*	Group C (Austenitic) *Chromium-Nickel; Non-Hardenable*
Chromium 11.50 to about 14%; carbon in balance up to about 0.40% (usually 0.15% or less); or chromium 16 to 18%, with carbon 0.60 to 1.20%. May contain nickel up to 2.50%, molybdenum up to 0.60%, and sulphur or selenium up to 0.40%. Magnetic.	**Chemical Analysis** Chromium from about 14 to 27%, with carbon up to 0.35% max. (usually 0.15% or less). May contain small percentages of copper, molybdenum and nitrogen. Magnetic.	Chromium-nickel combinations with chromium 16 to 26% and nickel 6 to 22% with carbon from about 0.05 up to 0.25% (usually less than 0.15%). May also contain titanium, columbium, molybdenum, sulphur or phosphorus and selenium. Non-magnetic.
Respond to hardening and tempering. Resulting physical properties also depend upon chemical analysis (principally carbon and chromium content). Brinell range: 140 to 600.	**Heat Treatment** Do not harden appreciably. For maximum toughness and good corrosion resistance should be annealed by cooling rapidly from about 1500° F. Brinell hardness 150 to 187.	Do not respond to hardening by heat treatment, but can be hardened by cold working to high physical properties. For maximum softness and corrosion resistance, anneal by cooling rapidly from 1850 to 2100° F. Brinell range 150 to 160. Can be work hardened to higher physical properties.
Are structurally dependable after proper heat treatment; low carbon types (under .15% max.) not brittle in notched sections or under impact.	**Toughness** High bend toughness; notch toughness may be low (depending on composition and heat treatment). Overheating lowers toughness. Structure is refined and toughness increased by alloying with nitrogen.	Stabilized and very low carbon types are extremely tough at all temperatures down to liquid air. Unaffected by notches. Exposure at temperatures between 900 to 1600° F may impair the toughness and corrosion resistance of nonstabilized types.
Not subject to excessive grain growth. Grain structure may be refined by heat treatment.	**Grain Growth and Structural Changes at High Temperatures** The types low in carbon and high in chromium are subject to marked grain growth when heated for long periods at temperatures higher than 1800° F. Grain growth is retarded by the addition of nitrogen.	Alloys near the austenitic-martensitic borderline tend to precipitate carbides at grain boundaries during service between 900 to 1600° F, losing some toughness and becoming susceptible to intergranular attack or corrosion. This can be controlled by very low carbon or by addition of titanium or columbium.
Thoroughly dependable for supporting any load or shock within their carrying capacity at working temperatures up to 1200° F. Strength much better than straight carbon steel for temperatures up to 1200° F.	**Strength at Elevated Temperatures** Creep strength about the same as Group A, but inferior to Group C. Load carrying properties are low at temperatures above 1300° F.	Alloys have high creep strength up to 1200° F; creep strength is further improved by molybdenum or columbium. Load carrying ability greater than Groups A and B.
May be forged, rolled (and in most cases pierced) at 2300° down to 2000° F. (Preheat and soak stock at about 1600° F.) The low carbon and free-machining types should be worked at higher temperatures; high carbon types at lower temperatures. Due to air hardening tendencies, slow cooling may be desirable.	**Hot Working Qualities** May be forged, rolled and in most cases pierced. To avoid grain growth should be heated quickly and not overheated or soaked. Forge from 2050° down to 1900° F. On last heat, forging may be continued down to 1500° F to refine grain. Alloys do not air harden.	May be forged, rolled and in most cases pierced. Preheat and soak at 1600° F, then heat quickly to about 2100 or 2300° F. Alloys do not air harden, and may be water quenched after hot working.
Low carbon varieties in the annealed condition can be easily cold drawn into wire; bars and sheets can be cold rolled, formed, bent, upset, coined and deep drawn. Free-machining and high carbon types are more difficult to work. Alloys work harden about like carbon steels.	**Cold Working Qualities** Can be cold drawn into wire, cold rolled, bent, formed, upset, coined and deep drawn, especially when warm (300 to 500° F). The alloy with 17% chromium is especially suited for deep drawing and forming. Alloys work harden about like carbon steels.	Can be cold drawn into wire, cold worked, bent, formed, upset, coined and deep drawn. The austenitic alloys work harden about twice as rapidly as Groups A and B. May be cold drawn or rolled to high tensile strengths.
Machine satisfactorily with properly designed tools and lubricants. The free-cutting types contain high sulphur or selenium and are very free-machining. Martensitic alloys are suitable for automatic screw machining.	**Machinability** Machining rates and tooling practices similar to Group A. The free-machining types contain high sulphur or selenium to improve machinability. Are suitable for automatic screw machining.	Most difficult to machine. Tools must be under constant feed at all times; if feed is released, allowing tools to ride the work, the surface work hardens rapidly and it becomes very difficult to resume cutting. Addition of sulphur or selenium greatly improves machinability.
Martensitic alloys make excellent rivets for driving cold. Air hardening, high chromium steels are not recommended for rivets driven above 1400° F.	**Riveting** Suitable for cold rivets. Hot riveting requires extra precautions to avoid brittle rivets. Rivets should be driven below 1400° F into chamfered holes.	Excellent for either hot or cold rivets. Hot rivets may be driven at any temperature above 1700° F.
Can be welded with gas, electric arc, or by resistance. Preheating and annealing immediately after welding is generally desirable to prevent cracking. Little grain growth. Cracking will be minimized by using austenitic electrodes. Free-machining types not recommended for welding.	**Welding Properties** Can be welded with gas, electric arc, or by resistance. Anneal to reduce embrittlement alongside of weld. Use small electrodes and low currents to minimize grain growth. Free-machining types are not generally recommended for welding.	Well suited for all welding methods. Weld does not air harden and is very tough. Where corrosive conditions are severe, use very low carbon or stabilized types (with Ti or Cb) of base metal and electrodes, unless the weld parts can be subsequently quenched. Free-machining types are not generally recommended for welding.
Increases with chromium content; inferior to Groups B and C. Resists weather, water, steam, and mild corrodents when chromium is 11.5% or more. If carbon is over 0.15%, must be hardened and tempered (below 800° F) for maximum corrosion resistance. Finished parts must be passivated.	**Corrosion Resistance** Possess corrosion resisting properties superior to Group A. Excellent for decorative trim except when exposed to marine atmospheres. Resists corrosion from many chemicals and food products. Especially good for nitric and other oxidizing acids.	Corrosion resistance generally better than Groups A and B, especially in reducing organic acids. Resistance to sulphite liquors and pitting attacks by chloride solutions markedly improved by additions of molybdenum. Resists industrial and marine atmospheres better than Groups A and B.
Scale resistance increases with chromium content. Alloys generally useful for continuous temperatures up to 1200° F, and in some atmospheres up to 1400° F.	**Scale Resistance** Superior to Group A. Resistant to destructive scaling up to 1500° F, rising with chromium content. Resistant to oxidizing and reducing gases.	Better than steels of equal chromium in Group B.
403, 405, 410, 414, 416, 420, 420-F, 431, 440-A, 440-B, 440-C, 440-F.	**Type Numbers** 430, 430-F, 442, 443, 446.	301, 302, 302-B, 303, 304, 308, 309, 310, 316, 321, 347.



A new 16 page booklet to tell you about real press engineering achievements.

HERE'S REAL PRODUCTION NEWS!

SEE WHY IT COSTS LESS TO RUN A DANLY PRESS!

This new booklet has been especially prepared to introduce the unique production advantages of the Danly Heavy Duty Autofeed Press . . . advantages that are certain to reduce stamping costs in your plant! Read about the new design principles that enable the Danly cool-running clutch to outwear conventional press clutches 7 to 1!

Check such outstanding advantages as extra frame rigidity, greater resistance to vibration and deflection at high speeds and consequent increased die life. Others include complete pressure lubrication, variable speed drive and more sensitive control reaction. Higher operating efficiency is assured over a greatly expanded tonnage range.

Also included are complete specifications on Danly Heavy Duty Autofeed Presses from 50 to 800 tons. Send for this booklet and see how Danly Autofeed Presses offer the advantages of automatic feeding in high tonnage capacities.

Heavy, rigid steel frame reduces vibration and deflection....
How the DANLY air-cooled, air-operated friction clutch reduces press DOWNTIME

Detailed descriptions and illustrations explain the cost and performance advantages of exclusive Danly features.

SEND FOR YOUR FREE COPY TODAY . . . .

USE THIS COUPON

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue, Chicago 50, Illinois

DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue, Chicago 50, Illinois

Please send my copy of the new Danly Heavy Duty Autofeed Press Catalog

NAME

POSITION

COMPANY

STREET ADDRESS

UNIVERSITY OF MICHIGAN LIBRARIES

Fig. 11—Typical electric arc furnace shop for melting stainless steel heats as seen from the casting pit

to test coatings on metals. The specimen is generally about 1 inch in diameter and pointed to resemble a plumb bob. This is subjected to a fog of salt water (4 per cent sea salt) for 100 hours in a closed box as shown in Fig. 10.

Practical experience with stainless steels during the past thirty years has shown certain analyses to be most useful. The selection has resulted in Table II prepared by the American Iron & Steel Institute. These steels have been arranged into three groups, A, B and C, by F. R. Palmer as shown in Table III. Steels in group A are characterized by their ability to be hardened by heat treatment to varying degrees and are magnetic. They are the simplest in analysis, containing 11.5 to 14 per cent chromium and up to 0.40 per cent carbon but usually less than 0.15 per cent carbon; or they may contain as much as 16 to 18 per cent chromium in which case the carbon is increased to 0.60 to 1.20 per cent. Steels in group A are generally hardened by heating to around 1800°F and quenching into oil; under the microscope it will then be noted that the structure is finely divided similar to the structure of a hardened tool steel. This structure is known as martensite.

Steels of group B are also of the straight chromium type and magnetic but unlike group A are nonhardenable by heat treatment. They contain from about 14 to 27 per cent chromium and usually have less than 0.15 per cent carbon. The group B steels are referred to as ferritic because they are found to be composed of grains similar to those found in pure iron.

Steels of group C are distinctly different—they are nonmagnetic, nonhardenable by heat treatment and contain nickel from 6 to 22 per cent in addition to 16 to 26 per cent chromium. This group of steels is referred to as austenitic.

As shown at the bottom of Table III certain AISI numbers fall into the A, B, and C groups. Straight chrome steels which make up groups A and B are all in the 400 AISI designation; whereas, chromium-nickel steels of group C are covered by the 300 AISI designation. Steels in each of the three groups in addition to the varying chromium, and carbon or nickel may also contain variable quantities of molybdeum, selenium, sulphur, columbium, titanium, etc. thereby accounting for the different type numbers.

PRODUCTION OF STAINLESS STEEL

In some respects the straight chromium 400 series steels constituting groups A and B are similar and may be compared with the chromium-nickel steels of group C as follows:

A—Steels of group A and B series are ferromagnetic at room temperature whereas those of the group C are nonmagnetic.

B—The mean coefficient of expansion of the austenitic stainless steels is, generally, about 50 per cent greater than those of ferritic type, as shown here:

MEAN COEFFICIENT OF EXPANSION x 10^6 PER °F.

Room Temp. °F.	300 Series	400 Series
32° to 212°	9.6	5.5
32° to 600°	9.9	5.6
32° to 1000°	10.2	6.4
32° to 1200°	10.4	6.5

From Steel Products Manual, AISI, Sec. 24, May 1946.

The above represent average expansions of each series but there are some variations within each series. For example, the high nickel alloys of the 300 series, namely, 25 per cent nickel—12 per cent chromium (type 309) and 25 per cent nickel—20 per cent chromium (type 310) have a slightly lower coefficient especially in the lower temperature ranges.

C—The modulus of elasticity of the chrome-nickel stainless steels is approximately 28,000,000 pounds per square inch. The 400 series steels, on the other hand, run around 29,000,000 pounds per square inch.[3] These are to be compared with accepted value of 30,000,000 pounds per square inch for ordinary steels.

D—Ordinary iron and alloy steel contract when they change from the ferritic to the austenitic stage on heating, which means that the austenite is more dense than the ferrite. This is also true when comparing austenitic with ferritic stainless steels. Chrome-nickel steels, for example, have a density close to 0.29 pounds per cubic inch, whereas ferritic steels of the 400 series run around 0.28 pounds per cubic inch.[4].

E—Specific electrical resistivity at room temperature for the chrome-nickel steels of group C runs around 72 microhms per cubic centimeter as compared with only 55 to 60 for the straight chrome in steels of groups A and B.

F—Generally the thermal conductivity and the electrical conductivity vary in a similar manner. One would expect, therefore, that because of the lower electrical conductivity of the chrome-nickel steels they would also have a lower thermal conductivity, and this is true. The thermal conductivity of the chrome-nickel stainless steels is about 9.4 Btu per hour per square foot per foot per degree F. The ferritic stainless steels run about 14.4. The thermal conductivity of the austenitic stainless steels decreases slightly with increasing chromium.

G—The specific heat of the chrome-nickel steels runs around 0.12 Btu per pound per degree F (32-212°F) whereas the specific heat of ferritic alloys is slightly lower, being 0.11.

H—Regarding color the 400 series steels have a somewhat more bluish tint than the 300 series steels and tend to resemble chrome plate. The 300 series steels are more yellowish.

(To be continued)

REFERENCES

1. Metals & Alloys Data Book, S. L. Hoyt, 1943.
2. Steel Products Manual, AISI, Sec. 24, May 1946.
3. Ibid.
4. Ibid.

AC or DC?

The Job Determines the Type of Welder

By Burke Porter, Chief Engineer
C. O. Porter Machinery Company, Grand Rapids, Michigan

Burke Porter

Extensive changeover of our woodworking machines from castings to weldments has made advisable the construction of a new plant devoted entirely to the fabrication of our machine parts. In equipping this new welding shop, we have given considerable thought to the types of arc welders to be installed.

Should they be AC or DC?

The advice of the local Lincoln Welding Engineer seemed sound—*install both types of welders and use the type which is best suited to each job.*

Accordingly, we installed three 400-amp. Lincoln DC "Shield-Arcs" and two 500-amp. Lincoln AC "Fleetwelders."

For the bulk of our work, DC is preferable. Much of it involves outside corner welds, all-position joints, intermittent beads, light-gauge material, tubular members, and we often weld stainless steel.

On the other hand, in the welding of our bases, inside corner joints and boxed-in areas result in considerable arc blow. Under these conditions, we can use higher amperages and get faster welding and better quality with the AC welders.

In this problem of AC and DC welding, the unbiased recommendations of the Lincoln people are advantageous to us and our customers. It pays to apply the right type of welding to match the job.

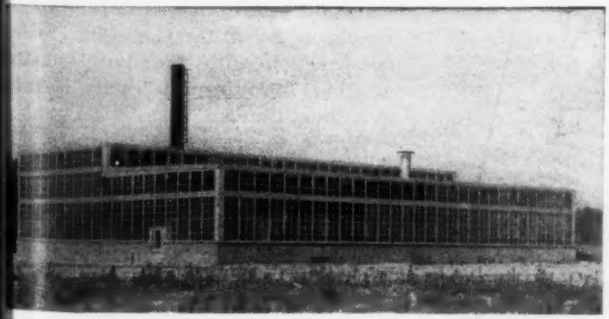


Fig. 1. New weldment plant of the Porter Machinery Co., evidence of the belief of this company in the superiority of welded steel for its products.

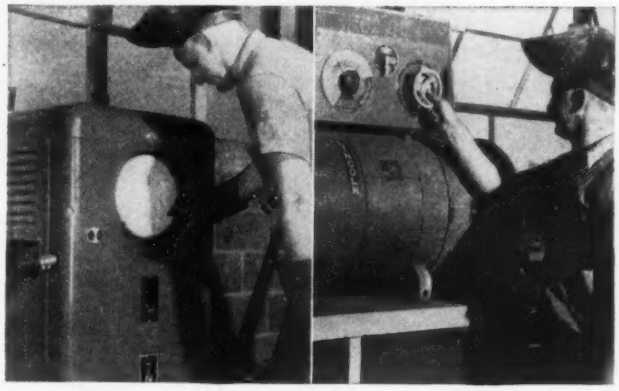


Fig 2. (Left) If arc blow is involved, the welder tackles the job with AC. (Right) If arc blow or very high currents are not involved, DC usually is best.

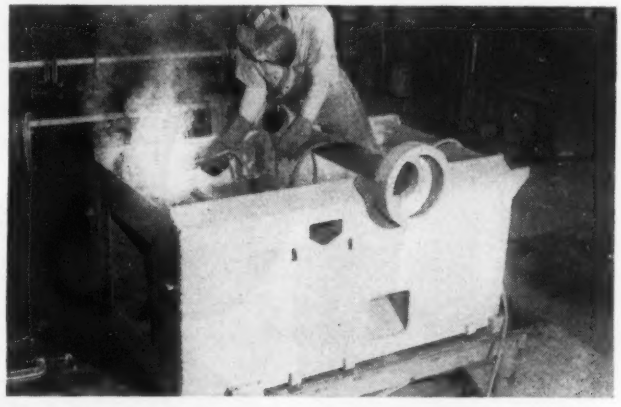


Fig. 3. Bases—where arc blow is severe—are welded with AC.

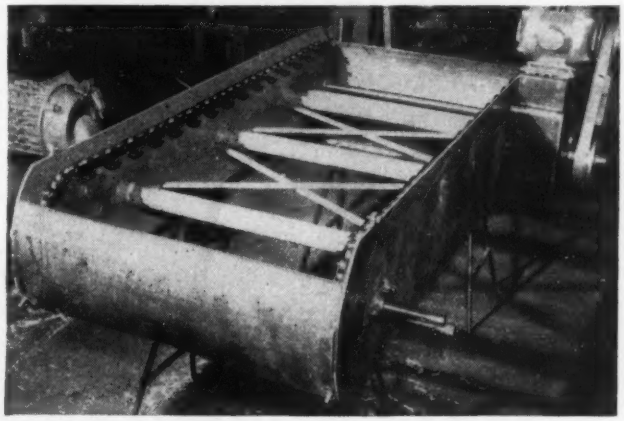


Fig. 4. Parts such as this frame are generally welded with DC.

The above is published by **THE LINCOLN ELECTRIC COMPANY** *in the interests of progress.*
Write for DC "Shield-Arc" Bul. 459 and AC "Fleetwelders" Bul. 366. The Lincoln Electric Company, Dept. 612, Cleveland 1, Ohio.

UNIVERSITY OF MICHIGAN LIBRARIES

"MULTICUT" "TUFCUT" "HOT WORK"
Wapakoneta
SHEAR BLADES
and ROTARY KNIVES
Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.
TOOL
Rx ENGINEERED TO THE JOB
Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.
The WAPAKONETA MACHINE CO.
Shear Blade Specialists Since 1891
Wapakoneta, Ohio

Aircraft Steels

(*Concluded from Page* 111)

no significant dimensional changes occur in the steel upon completion of the cycle, the steel tends to restrain the complete shrinkage of the chromium layer and thereby increases the tensile stresses in it.

If the chromium-plated steel is heated to a sufficiently high temperature (above 400° C), the contractive forces in the chromium produce sufficient tensile stresses to cause plastic flow or rupture of the chromium plate thus relieving the residual tensile stresses in it. Thus, when "tongued" tubes, Fig. 1, were heated above 400° C, the free ends of the tongues were depressed below the surfaces of the tubes, indicating a release of the restraint in the steel initially caused by residual tensile stresses in the chromium. This suggests that the increased fatigue limits produced in the fatigue specimens heated above 400° C were caused by stress relief in the chromium plate accompanying its plastic flow or rupture.

COMPOSITION OF STEELS USED IN STUDYING THE INFLUENCE OF CHROMIUM PLATING ON THEIR FATIGUE LIMITS

	—SAE X4130 Steel—			SAE 6130 Steel
Element	Lot A	Lot B	Lot C	
Carbon	0.35%	0.29%	0.33%	0.30%
Manganese	0.53	0.47	0.55	0.61
Phosphorus	0.01	0.02	0.03	0.03
Sulphur	0.02	0.02	0.01	0.04
Silicon	0.21	0.25	0.24	0.25
Chromium	0.95	0.96	1.05	1.01
Molybdenum	0.19	0.24	0.20	*
Vanadium	*	*	*	0.22
Nickel	*	0.15	0.17	*

* Not determined.

Tests 12 Lubricants at Once

STUDYING of corrosion characteristics, oxidation stability and the varnish and sludge formation tendencies of lubricating oils is possible with an improved apparatus which is capable of evaluating 12 samples at one time. Called the Poly-Veriform lubrication tester, it was developed by Precision Scientific Co., Chicago, in co-operation with Standard Oil Co. of Ohio. Instrument is easily cleaned in a short time.

Within the range of its operations are studies on the effect of experimental variations in additive composition, the effect of additive concentration in a base oil, additive response in different types of base oils and the effect of corrosion inhibitors in combination with corrosive detergent-type additives. The apparatus can also be used as a quality control instrument. It is a complete and self-contained unit that can be transported to and operated in any part of a laboratory.

SPRINGFIELD

announces

its *New* **Model S,**

The

"World's Best Investment"

in Lathes

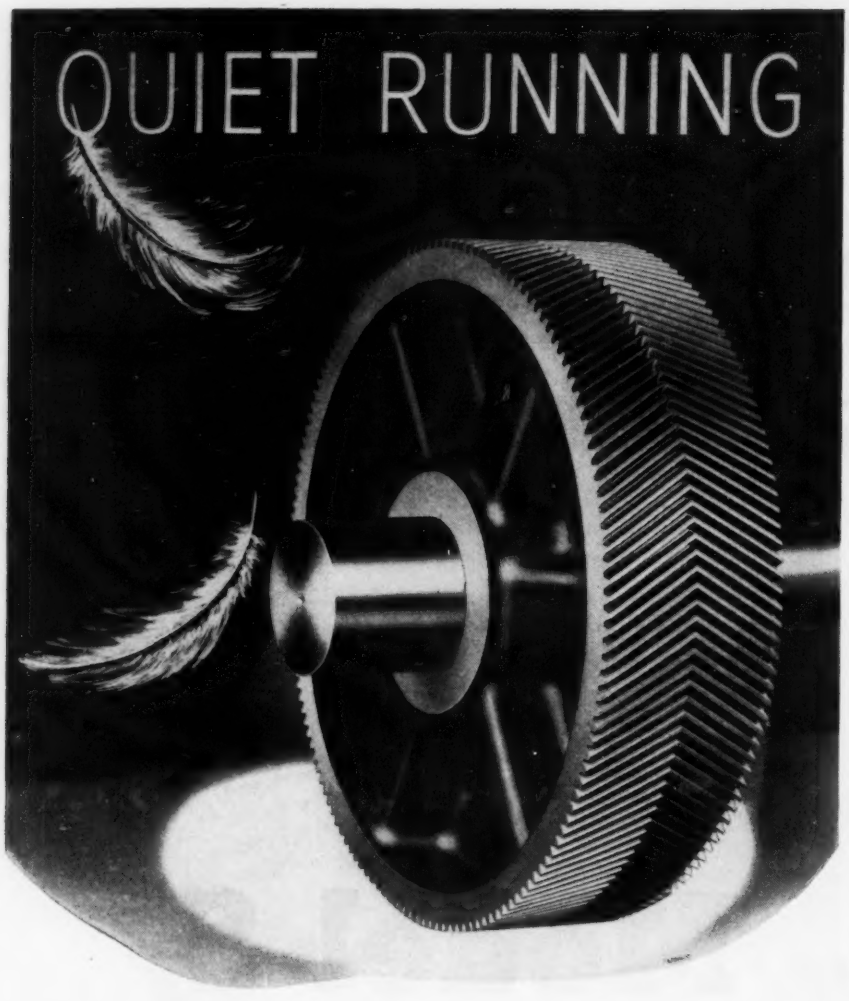
THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

UNIVERSITY OF MICHIGAN LIBRARIES



HERRINGBONE GEARS
by Horsburgh & Scott

● Here's why Horsburgh & Scott Herringbone gears are quiet and smooth running at all speeds . . . 1. Sykes type where two or more teeth are always in contact. 2. Teeth accurately generated on finest gear cutting machines with correct amount of backlash. 3. End thrust entirely eliminated. 4. Pitch line absolutely concentric with bore. 5. Rims, arms and hub extra heavy for pitch of gear. It will pay you to try these superb gears.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 HAMILTON AVENUE • CLEVELAND 14, OHIO, U. S. A.

Investment Casting

(*Concluded from Page* 117)

steels—the counterweighted coil is raised from around the crucible and free from the rotating portion of the machine. The preheated mold, previously clamped in place in the fixture and resting on its side, and the crucible are moved into contact with each other by a hand lever so that the orifice near the top of the crucible is in line with the mold sprue. The machine, which has variable-speed drive and adjustable counterbalance, is set into operation. When it attains required speed the metal flows by centrifugal force into the mold. This method assures good molecular structure and exact duplication of the most intricate mold designs. One operator using one machine can fill about 12 molds per hour.

Vacuum Casting—Parts which provide a good gating design adapt themselves well to vacuum casting. This method gives large grain growth and there is no turbulence in the metal as it enters the mold. Another advantage of vacuum casting is that the metal can be skimmed off, resulting in cleaner metal. The preheated mold is placed on a special table and a vacuum of 25 inches of mercury is applied to the bottom of the mold. Metal charges are made up the same as for centrifugal casting and are melted by induction, but pouring from the crucible is by hand.

After the metal in molds has cooled, the clusters are shaken out, cleaned and given a smooth machine-like finish by a fine sand blasting operation, as shown in Fig. 4. The finished castings are then removed from the sprues by cutting with high-speed abrasive cutoff wheels. This operation is shown in Fig. 5. Average run of rejects is about 10 per cent for close dimensional parts, which is considered a low figure.

By nature of the Electronicast process, certain limitations are placed on the size of the parts that can be cast by it. It is particularly adaptable to small parts of intricate design where strength must be high and cost of machining operations is prohibitive. In general, 5 pounds is considered the limit for parts manufactured by the method. One of the chief advantages is the ability to cast metals possessing high melting points and extreme hardness.

Because of the improved density obtained by centrifugal casting, excellent tolerances can be maintained. For pieces of moderate shape, tolerances generally can be held to plus or minus 0.005-inch. Highly intricate shapes may require broader tolerances.

Northern OVERHEAD ELECTRIC CRANES

Handling heavy loads with Northern Overhead Cranes allows the use of your entire floor space for production. No other means of handling allows the use of every square foot of floor space and provides handling facilities over the entire area.

Northern Overhead Cranes are designed to handle heavy loads quickly and carefully. No matter how large or how small the loads to be handled, there is a Northern Crane designed to suit your most exacting requirements. Fifty years of experience as crane builders guarantee the performance of Northern Cranes.

NORTHERN ENGINEERING WORKS

General Offices: 2625 ATWATER ST.
DETROIT 7, MICH.

HEAVY DUTY CRANES • LOW HEADROOM CRANES
BUCKET CRANES • TRANSFER CRANES • ELECTRIC
HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

UNIVERSITY OF MICHIGAN LIBRARIES

Only Binks Dynaprecipitor water-wash spray booths

GIVE YOU ALL THESE ADVANTAGES

J. E. Roche
Chairman of the Board

No other spray booth gives you the high efficiency and low cost operation to be found in a Binks Dynaprecipitor unit. There are 148 standard sizes from which to choose. "Engineered" booths are available in any size or shape.

The use of a Binks Dynaprecipitor unit reduces fire and explosion hazards by removing all overspray from the room. The finishing department stays cleaner and more healthful — a pleasanter place in which to work.

Exhaust air washed 5 times: The paint and fume-laden air passes through 5 thorough washings before it is vented. See 5 stars (★) on Figure 1. Paint pigment is collected in the Dynaprecipitor. It will not unbalance the fan, or collect in the exhaust ducts or on the exterior of the building.

Dynaprecipitor stays cleaner much longer: All surfaces with which the overspray comes in contact are constantly flushed. Booth cleaning time is minimized.

Unique clog-proof construction: There are no nozzles to clog. The water is distributed directly from the large manifolds by means of deflector plates.

Uniform distribution of large water volume: There are no breaks in the water curtains . . . no gaps in the air-washing spray. There is more water circulated per lineal foot of a Binks Dynaprecipitor than any other booth.

Efficient paint reclamation: This unit washes out and collects an exceptionally high percentage of the overspray for reclamation. Heavy solids and light pigments collect in the fore part of the pan and are prevented by a divider in the pan from recirculation through the system.

Manifolds constantly flushed: The water constantly circulates through the manifolds to prevent settlement of sediment. This is illustrated in Figure 2.

Water economy: The water is circulated over and over again. Moisture eliminators remove all of the water from the air before it is vented.

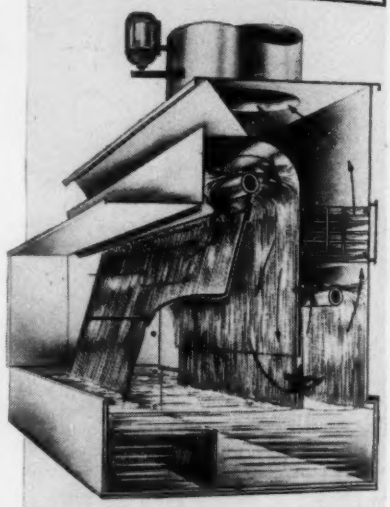


FIG. 1
Diagram showing passage of air through a Binks Dynaprecipitor water wash spray booth. Stars (★) mark 5 places where the exhaust air is washed.

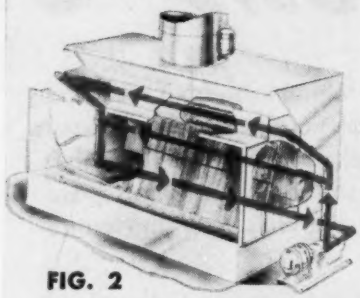


FIG. 2
Diagram showing the water circulating system.

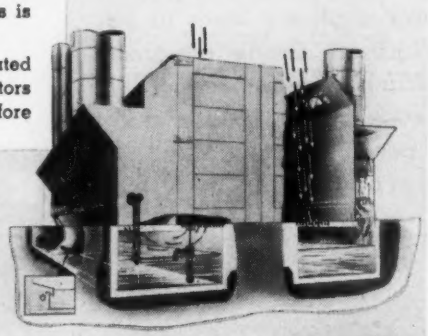


FIG. 3
Diagram of a Binks down-draft Dynaprecipitor unit, showing the flexibility of the Dynaprecipitor principle. In this booth the air is vented through grills in the floor. This layout is ideal for use with heavy products such as automobiles, railway cars, etc.

Binks *Send now* for your free copy of our new Catalog-Data Book.

MANUFACTURING COMPANY
3134-40 Carroll Avenue, Chicago 12, Illinois

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND
DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH
ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

Carbide Die Practice

(*Continued from Page* 120)

(2200° F) than is used with chromium types which are heated no higher than 2050° F. This was brought out by S. P. Watkins, market development division, Armco Steel Corp., Baltimore, in speaking on "Processing of Stainless Steel Wire." Chromium grades, he stated, are susceptible to grain growth at elevated temperatures as well as scaling heavily so it is desirable to roll these grades at a low temperature.

The Lead Problem—In order to take heavy drafts on stainless, it is necessary that the surface be coated with a metallic or other material having a low antifriction and galling properties. Up to the present time lead has been the most satisfactory coating for the roughing drafts. The speaker suggested that adequate ventilation should be provided for such installation inasmuch as there is some indication that the use of lead prevents a health hazard inasmuch as dangerous concentration may build up in the atmosphere around high-speed tandem draw machines.

If lead is employed for drawing lubricants, it is extremely important that it be removed entirely before the wire is processed annealed. If not completely removed, it will often cause tipping of the surface during annealing. Stripping is accomplished by treating in a 5 to 10 per cent bath of nitric acid at 140/150° F for about 15 minutes. To test for completeness of lead removal, a dilute solution of sodium dichromate is sprayed on coils and if lead is present on the surface a yellow precipitate will form which indicates incomplete removal of the metal.

Particular emphasis was laid on the desirability of eliminating sulphur as an ingredient of drawing compounds and lubricants particularly with regard to copper and nickel by E. G. deCoriolis, director of research, and O. E. Cullen, chief metallurgist, Surface Combustion Corp., Toledo, O., in their paper on "Protective Atmospheres for Annealing Nonferrous Wire." In order to insure brightness of the annealed copper wire, it is essential to maintain small but sufficient amounts of elusive gases in the furnace atmosphere, such as carbon monoxide and hydrogen. Their presence assures not only the complete elimination of all free oxygen during the combustion of a suitable air-gas mixture in an atmosphere generator or in a direct fired bright annealing furnace but also counter-

balances traces of free oxygen which may enter the furnace.

Present day air-gas proportioning devices are of sufficient accuracy to insure a constant flue gas analysis over the entire range of burner capacities and turndown. Thus, the author explained, the same composition of the gases within the furnace chamber can be maintained regardless of the rate of firing.

Convection heating is recommended for copper wire and several other nonferrous wires because of their comparatively low annealing temperatures. Convection heating is much more efficient at low temperature than is radiation heating.

If copper and nickel wires are annealed in strand form, they may be water quenched directly from the heating chamber, thus eliminating cooling zone problems. Usually the quench water is maintained between 150 and 200° F so that moisture will evaporate rapidly from warm wires.

Simplifies Sling Selectivity

SIMPLIFYING the selection of sling chain for every requirement and providing a permanent record of performance for specific chains used in shops and factories, is a wall chart issued by McKay Co., Pittsburgh. Working load limits of sling chains in 9/32 to 1-inch sizes are shown, as are weights of the loads that can be lifted when a given sling is used at angles of lift from 10 to 90 degrees. Back of chart lists Chain Institute definitions, instructions and cautions governing use of sling chains. Space is provided for identifying chain, date of purchase, inspection and number of branches, etc.

Ceramic Has Wide Usage

CAPABLE of withstanding 115 tons either in compression or torsion, is a new ceramic material, Diamonite, developed for such applications as abrasives, cutting or turning tools, bearings, forming dies and punches, textile thread guides, valves and small tubes, electroplating bath fixtures and electrical insulators. Developed by Diamonite Products Division, of United States Quarry Tile Co., Canton, O., the material reportedly withstands temperatures in excess of 3000° F.

Other characteristics include ability to stand up under either mechanical force or temperature change shocks, being nonabsorbent either with or without a high polish, resistance to strong acids or alkalies, ability to conduct heat and perform as a nonconductor of electricity.

HOW Big Businesses are using CLARK Methods and Machines as the quick, sure means **TO** lower that all-important break-even point, and the amazing extent to which they **SAVE** production time, human effort, storage capacity and **MONEY**

— are described and pictured in the MATERIAL HANDLING NEWS

This stimulating "tell how" magazine, and Clark's invaluable "show how" motion pictures, rich with proved money-saving ideas that *you, too, can use,* will be sent to you at no cost. No obligation! Simply request them on your business letterhead.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 26, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

THE NATIONAL GUARD DEFENDS AMERICA—JOIN NOW

UNIVERSITY OF MICHIGAN LIBRARIES

three ways to describe BROSIUS clay guns in operation at the blast furnace tap hole. For 31 years BROSIUS engineers have diligently applied their experience to the design and production of efficient low-cost guns. That's why so many BROSIUS guns have been working so long—so well. Available electric, electric-hydraulic, steam—pedestal or column mounted. For fast, sure, safe guns—please write to us.

Edgar E.
BROSIUS
Company Inc.
SHARPSBURG • PITTSBURGH 15, PA.

Steel Valve Research

(*Concluded from Page* 124)

of actual thermal gradients within various valve designs is important. Such operating data are compiled by the laboratory by means of thermocouples and multiple recorders attached to the equipment that passes high temperature fluid through the valves. Pressure also can be applied to these valves for measuring creep and deformation at high temperatures.

An interesting operating test used by the laboratory involves the use of a valve stem thread tester that operates the stem up and down continuously at any predetermined temperature. The machine, especially designed by Edward, provides a travel of ½ up to 4 inches, torques up to 50 foot pounds and operating loads from 0 to 3000 pounds. It is designed so coefficient of friction between the thread and bushing can be measured continuously. Amount of wear or time of galling also is indicated by the unit. Wear of valve stems in the high pressure-high temperature valves is quite different from that encountered in most other machinery in that operations are quite slow while temperature and degree of lubrication is usually slight.

As the company uses the laboratory facilities to control incoming materials and various plant processes, it also includes some specialized equipment to conduct radiographic work, chemical testing, etc. A number of the rooms of the new laboratory are air conditioned to control humidity for critical work.

No Crumpled Steel in Fires

TO PREVENT steel from crumpling when it is exposed to hot flames in burning buildings, Eagle-Picher Co., Cincinnati, has developed a lightweight fireproof cement.

Tests of the protective coating have been completed by Underwriters' Laboratories Inc. The material was rated by the laboratories and listed for re-examination service. When it is applied in a layer 1¾ inches thick, the cement will retard the effect of great heat for 3 hours. It is sold as a gray powdered material which is mixed with water to form a stiff paste. It is troweled onto ribbed metal lath wrapped around the steelwork to be protected. Product will be manufactured in the Eagle-Picher laboratories in Joplin, Mo.

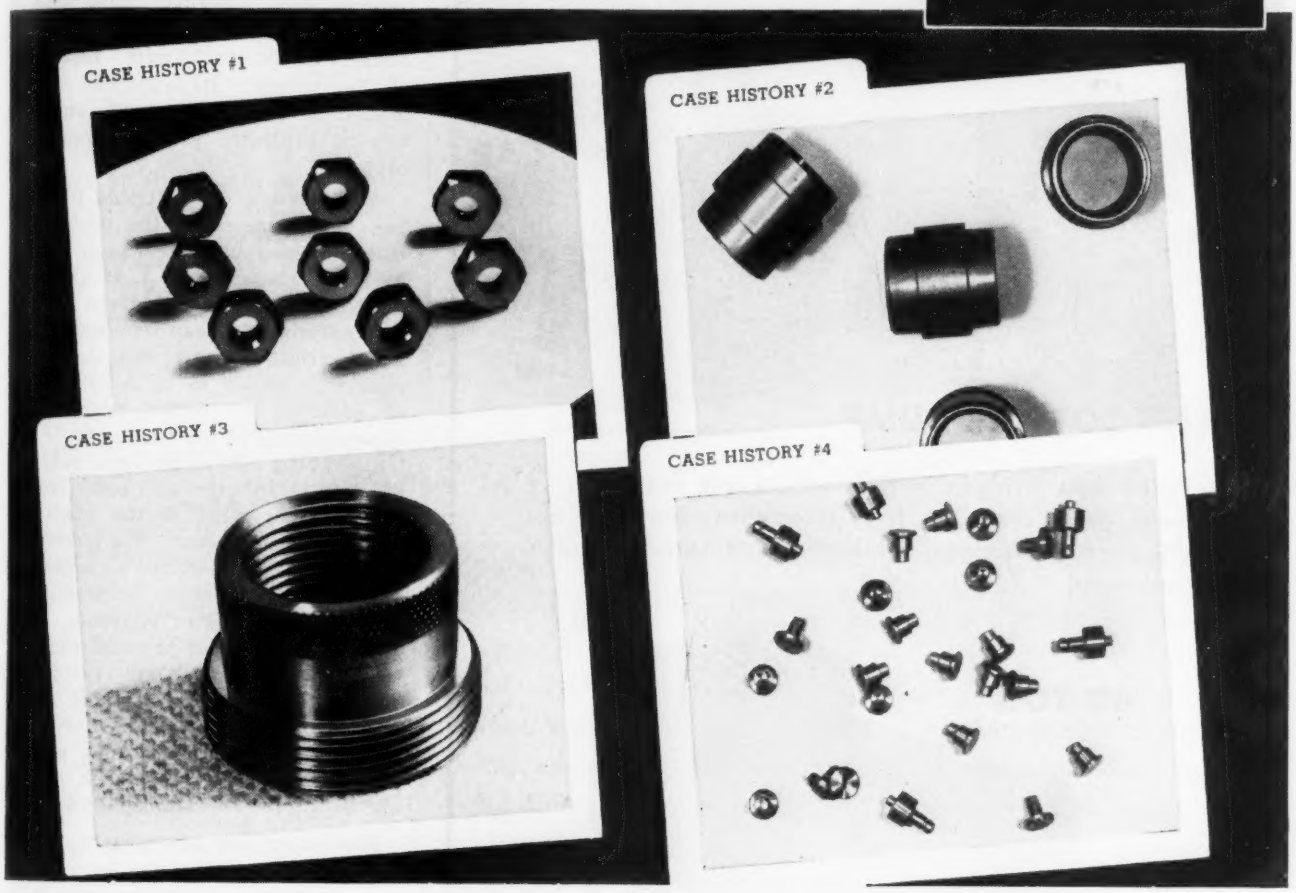
Brochures describing the fireproof material are available from the company.

Four typical machine shops report

"LONGER TOOL LIFE"
"BETTER FINISH"
"FASTER OPERATION"
} WITH NEW

J&L FREE-CUTTING "E"* STEEL

J&L STEEL



Four typical examples, taken from 100 case histories, show superior machinability of J&L "E" Steel.

For 4 years before "E" Steel was publicly announced, this new, free-cutting bessemer screw stock was tried by independent machine shops throughout the metal-working industry.

More than 6,100 tons were tested in over 100 applications!

Here are quotations from 4 typical case histories:

CASE HISTORY #1 ". . . tool life increased 100% at normal speeds . . . better finish . . . shop people liked it."

CASE HISTORY #2 ". . . tool life increased up to 200% . . . uniformity of finish remained constant . . . considerably increased speeds without sacrifice to finish."

CASE HISTORY #3 ". . . tool life increased two to four times . . . we were able to tap 1" full internal pipe thread, almost impossible on regular material."

CASE HISTORY #4 ". . . new steel machines very well . . . finish excellent . . . tool life increased . . . 5 to 10% better production."

You too can get greater economies in your machining operations with new J&L free-cutting "E" Steel. "E" Steel is available in three grades: E-15, E-23 and E-33, each within the composition limits of the standard bessemer screw steels and with similar tensile properties. All standard sizes and shapes are available. For further information write for your copy of our new booklet: "J&L 'E' Steel."

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 19, Penna.

Please send me a copy of "J&L 'E' Steel."

Name_____

Company_____

Address_____

JONES & LAUGHLIN STEEL CORPORATION

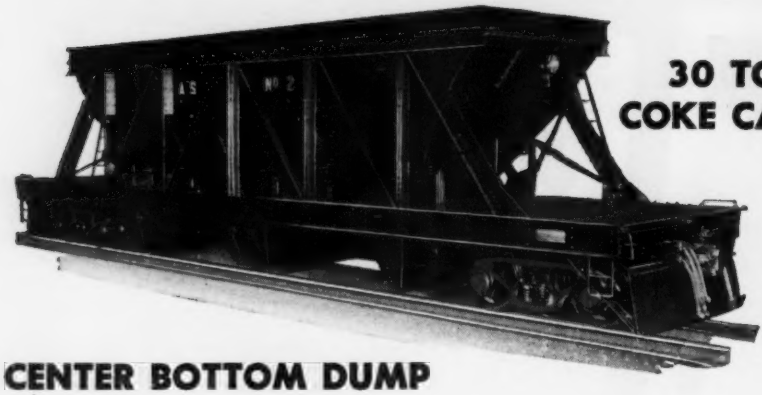
* "E" STEEL IS QUALITY-CONTROLLED FROM OUR OWN MINES THROUGH THE FINISHED PRODUCT

UNIVERSITY OF MICHIGAN LIBRARIES

ATLAS

INTRAPLANT HAULAGE EQUIPMENT

SPEEDS PRODUCTIONS—LOWERS COSTS

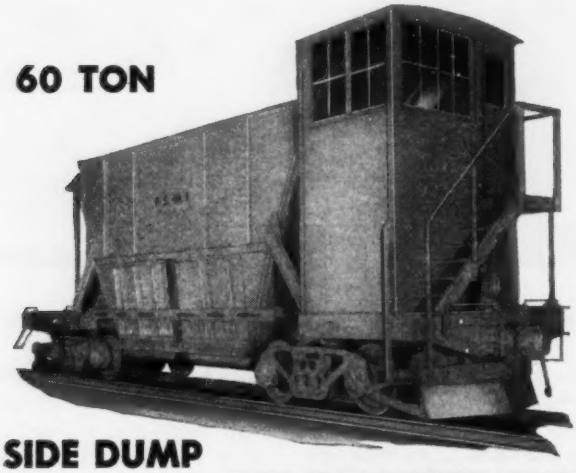


30 TON COKE CAR

CENTER BOTTOM DUMP

Trailer Type divided into two sections with rolling bottom dump gates controlled from locomotive cab. Car has self-aligning bearings, air brakes and standard safety equipment.

60 TON



SIDE DUMP ORE TRANSFER CAR

Two compartment hopper with separate discharge gates, independently operated from front and rear vision cab. Car is equipped with air brakes, self-aligning bearings and standard safety equipment.

ATLAS ENGINEERING SERVICE IS ALWAYS AT YOUR SERVICE

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

Physics of Powder Metallurgy

(*Continued from Page* 127)

daries on diffusion currents, allowance being made for possible anisotropy of surface tensions and grain boundary tensions to stress was discussed. The mechanism of changes occurring in the density of powdered-metal compacts and experiments designed to reveal the kinetics of the process were described in a paper by A. W. Postlethwaite and A. J. Shaler of Massachusetts Institute of Technology. Radiographic techniques were used to study the shrinkage of synthetic pores in massive copper.

A discussion of electrical properties as indicators of the degree of sintering was presented in a paper by H. H. Hausner and J. H. Dedrick of Sylvania Electric Products Inc. A sintered material was represented as an electrical network and the total resistance shown to be a composite of parallel and series resistances. Measurements of the resistivity or its temperature coefficient were said to be more informative and more easily applied than other means, such as density measurements. The electrical properties were described as sensitive indications of changes occurring in the earliest stages of sintering, during which the other physical properties showed hardly any variation. Techniques were described for utilizing electrical resistance determinations in the study of various stages of sintering in vacuum and in reducing or protective atmospheres.

Mechanism of Sintering — Two papers were presented on the mechanism of sintering in the presence of a liquid phase. F. V. Lenel of Rensselaer Polytechnic Institute described the sintering of compacts made of 80 per cent iron powder and 20 per cent copper powder by weight. The compacts were sintered between the solidus and liquidus temperatures of the alloy system, where an appreciable amount of liquid was formed. The iron particles were slightly soluble in the liquid. The principal variables studied were the effect of particle size of the iron powder on the rate of densification and upon the rate of growth of the spherical iron particles in the microstructure of the alloy. The second paper, by R. Kieffer of Metallwerk Plansee, Austria, was read by S. J. Sindeband of American Electro Metal Corp., and concerned the sintering mechanism of carbide-binder compositions in the presence of a liquid phase. When compacts of tungsten carbide and cobalt powders were subjected to heat,

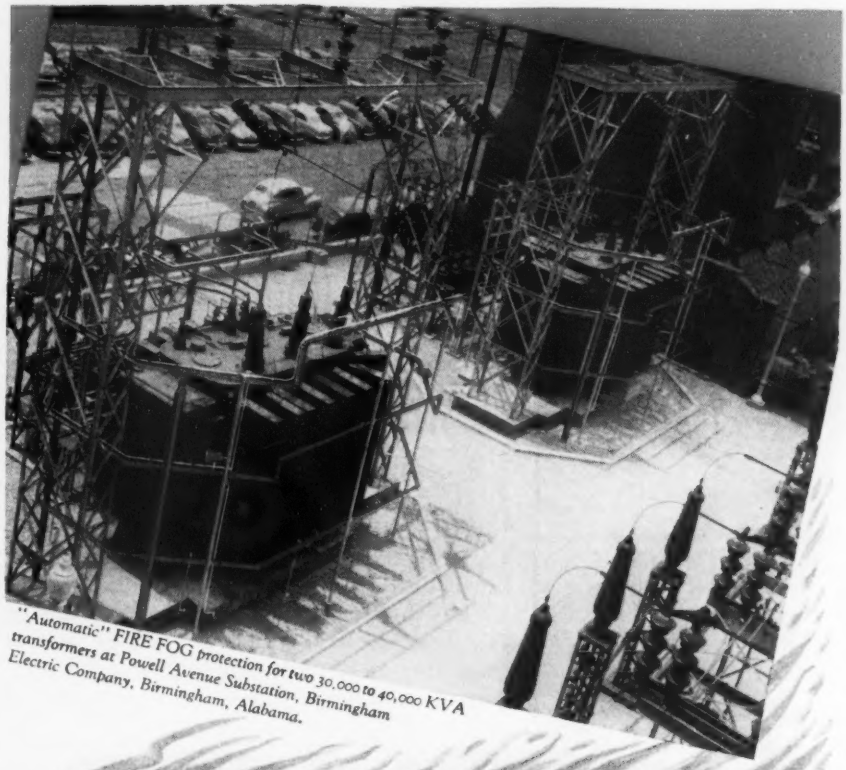
the formation of skeletal bridges of carbide was disrupted during the sintering process and then reformed through precipitation. Density, hardness, and transverse strength were discussed in relation to the percentage of cobalt and to sintering time and temperature.

An investigation of the properties of tungsten powder by reduction from its oxides was reported by B. Kopelman of Sylvania Electric Products Inc. Rates and mechanism of reduction of tungsten trioxide by hydrogen and the resultant alterations in the powder composition were described. Distinguishing features of metal powder prepared by hydrogen reduction of its oxide were found to be (a) presence of sintered agglomerates which behave essentially as single particles, and (b) presence of pores of varying size depending on the time and temperature of sintering.

Titanium Carbide Powder—Production of pure titanium carbide powder by means of carbonizing gases was discussed in a paper by V. Fattinger of the University of Graz, Austria, read by J. L. Zambrow of Sylvania Electric Products Inc. Formation of very pure carbides was accomplished by reaction of titanium in either the solid or gaseous phase with carbonizing atmospheres.

The techniques used to prepare alloy powder products from fully alloyed powders were described by G. Comstock of Stevens Institute of Technology. Several methods of forming ferrous and nonferrous alloy powders were discussed and the use of these in sintered compacts was shown to give better homogeneity than powders of separate metallic components. Examples given of alloys prepared by this method were Co-Cr-Ni, Cu-Pb, brasses, bronzes, carbon and alloy steels, and special heat-resistant alloys. Hot and cold pressing procedures were described for alloy powders.

Hot Pressing—A survey of principles and present status of hot pressing was presented by C. G. Goetzel of the Sintercast Corp. of America. Need for special equipment and improved techniques was stressed as being essential for future expansion of industrial production by hot press methods, which have been largely experimental to date. Complete densification has been demonstrated for parts made from copper, gold, brasses, bronzes, irons, steels, and cemented carbides. Hot pressing was shown to give a marked improvement in hardness, compressive and tensile strengths, and ductility over conventional cold pressing methods. Prob-



"Automatic" FIRE FOG protection for two 30,000 to 40,000 KVA transformers at Powell Avenue Substation, Birmingham Electric Company, Birmingham, Alabama.

Ready, Willing and Able
TO COMBAT ELECTRICAL EQUIPMENT FIRES

Only a hint of flame at this bank of high voltage transformers and—quick as a flash, Automatic FIRE-FOG goes into action. From strategically positioned nozzles, a concentration of fine water spray is directed at the blaze. Flames are forced down . . . the fire area cooled. In but a matter of seconds, extinguishment is complete and damage to equipment confined only to the point of fire origin. Even out-of-service time has been held to a minimum.

Automatic FIRE-FOG
IT BLANKETS · IT ISOLATES · IT QUENCHES

. . . a famous member of the "Automatic" Sprinkler Family . . . provides basic fire protection for process equipment and storage in the chemical and petroleum industries. On-the-spot protection for quench tanks, dryers, explosive hazards, conveyor openings, air filters, oil filled electrical equipment and other units vital to production line operations.

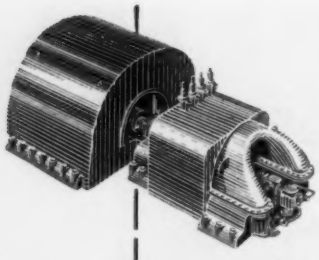
Although a relatively new development, Automatic FIRE-FOG is widely recognized by both utility companies and private users. Designed specifically for your particular risk it is electrically safe and carries the approval of all leading insurance authorities.

More detailed information, especially as to how Automatic FIRE-FOG can serve your needs is available upon request and surveys and estimates will be furnished without cost or obligation. Write today.

"AUTOMATIC" SPRINKLER CORP. OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT . ENGINEERING MANUFACTURE . INSTALLATION
OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

UNIVERSITY OF MICHIGAN LIBRARIES



New life expectancy for impeller blades ..with Super-Clean Air!

ABRASIVE dust and dirt entering a high-speed rotary blower are sure death to steel impeller blades. When these blades hit this grit-loaded air, it's like trying to cut through a sandstorm. Rapid wear and erosion result, and you have a replacement problem on your hands.

But there's a sure-fire answer to this problem: AAF Multi-Duty Air Filters. Installed at the blower intake, AAF Multi-Duty filters out abrasive particles—preventing this killing dust and dirt from reaching the rotary blower.

The AAF Multi-Duty is an automatic, self-cleaning air filter. Overlapping panel construction combines self-cleaning and high efficiency air cleaning as integral functions of the operating cycle. Uniformly constant air supply is assured as operating resistance remains fixed when once established for a given dust concentration.

Increase the life expectancy of your impeller blades with AAF Multi-Duty Air Filters—you'll find the cost is only a fraction of the savings. Write for complete information or call your nearest AAF representative.

American Air Filter Company, Inc.
443 Central Ave., Louisville 8, Ky.
In Canada:
Darling Bros. Ltd., Montreal, P. Q.

AAF
AIR FILTERS
AND DUST CONTROL EQUIPMENT

lems of heat-pressure-time relationships and of heat-resistant die materials and lubricants were pointed out.

A study of the pressing of metal powders and of theories of pressing phenomena was presented by R. P. Seelig of the American Electro Metal Corp. An analysis of the behavior of metal particles under pressure was made to show the influence of particle size and of die shapes. Rubber washer models were studied to show the movement of particles under various compacting conditions, providing a graphic demonstration of packing, deformation, and cold working. Effects of lubricants on resistivity of copper powder compacts were shown, and evidence was presented which supported a theory of sintering at room temperatures.

A new technique of examining subgrain structures with the electron microscope was described in a paper by Laurence Delisle and G. A. Davis of Sylvania Electric Products Inc. Studies were made of tungsten specimens and single crystals of copper, and a series of electron photomicrographs clearly showed the sub-grain blocks. Sizes of the blocks and their degree of disorientation within the individual grains were of the same order of magnitude as the values calculated from x-ray results and those obtained by other techniques. The observations appeared to confirm and illustrate the existence of complex grain structures necessary to explain the physical behavior of metals. A paper by A. D. Power and I. Kakascik of the Radio Corp. of America described the use of the electron microscope for the evaluation of particle size and distribution for tungsten and molybdenum powders. The method was used to differentiate between powders used in wire manufacture as an indicator of those lots which would be satisfactory for production. The electron microscope technique was described as a means of correlating size distribution curves with production efficiencies, this correlation occurring for about 75 per cent of the lots tested.

Diffusion in Fluorescence—A paper on the role of diffusion in fluorescence was presented by K. H. Butler of Sylvania Electric Products Inc. Problems confronting the fluorescent engineer were discussed in regard to the formation and growth of crystals and the development of fluorescence in ionic phosphors. The case of the preparation of calcium halo phosphates was cited to show how the formation of crystals from reacting components was accompanied by interdiffusion of various ions. This

EACH month *The Saturday Evening Post* readers by the thousands see a Nicholson cartoon ad like this which helps to make "Nicholson" the most widely remembered name in files. But industrial production heads and workers know these famous files for their *practical* qualities . . . for having all the essential requisites of "the perfect file," to wit:

- **STRAIGHTNESS**—for holding the filing stroke "to the line" when necessary.
- **ACCURATE CUT**—teeth of even height, sharpness and spacing to assure full, smooth bite.
- **UNIFORM HARDNESS**—to avoid "skips-and-grabs" and uneven wear.
- **PROPER BALANCE**—for steady filing strokes.
- **GOOD STEEL**—for long file life.

No wonder the world's largest file manufacturer can guarantee you *Twelve perfect files in every dozen!* No wonder leading industrial distributors prefer to recommend and sell you the Nicholson brand—or its twin, Black Diamond! Write to us for:

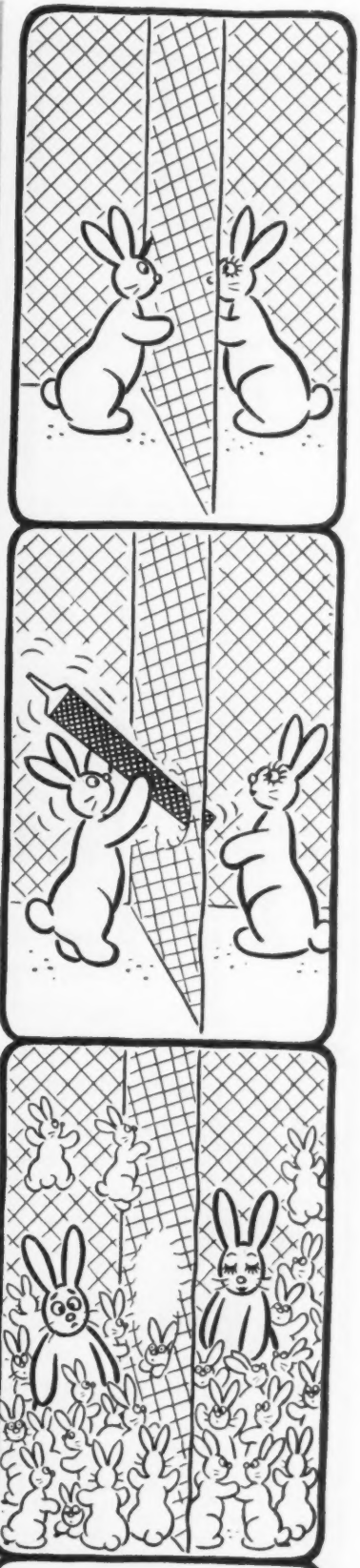
FREE TECHNICAL BULLETIN on ten Special Purpose files to help assure you *The right file for the job.* **FREE BOOK, "*FILE FILOSOPHY*"**—the Nicholson "textbook" on kinds, use and care of files (sixteenth popular edition).

NICHOLSON FILE CO., 71 Acorn Street, Providence 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON FILES *FOR EVERY PURPOSE*

LONG ANGLE LATHE FILE to produce a fine finish on metal being turned in a lathe.

Things you need in the files you use



a Nicholson file for every purpose

Accurately cut, perfectly balanced, uniformly hardened. Made by the world's foremost file manufacturer.

NICHOLSON U.S.A. and BLACK DIAMOND TRADE MARK

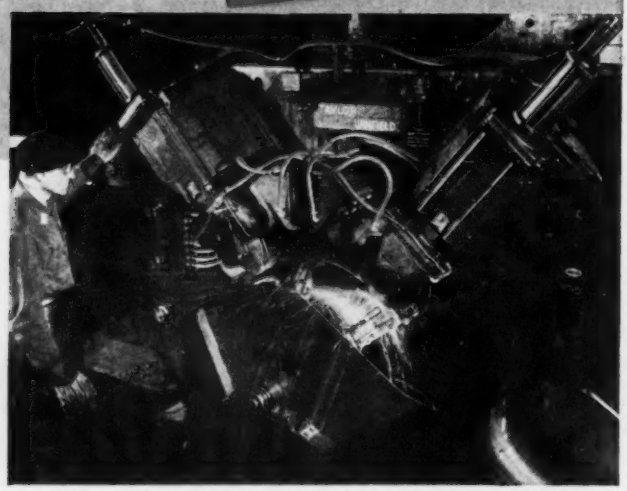
UNIVERSITY OF MICHIGAN LIBRARIES

WEIGER-WEED
TRADE MARK

Resistance Welding Electrodes

figure largely in

greatest, costliest, most modern setups



COURTESY OF THE TAYLOR-WINFIELD CORP.

Resistance welding is at its highest development, from a time and cost saving standpoint, in some of the elaborate setups used in the automotive industry. For welding equipment alone, investments of several million dollars are commonplace, and months are spent in planning and development.

Weiger-Weed engineers are called in frequently to contribute ideas, to make cost saving suggestions, and to supply electrodes, dies, seam welding wheels and other current-carrying parts. That is why the Weiger-Weed plant is located in the center of the automotive industry.

This consultation service regularly used by mass-production experts is available to the smallest user of resistance welding, and at the same cost—that is, no cost at all. Weiger Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan. 11505-B

This book contains latest information on resistance welding—with description and illustrations of Weiger-Weed complete line. Send for your copy gratis.

WEIGER-WEED
TRADE MARK

RWMA ALLOY GROUP

ONE OF THE FANSTEEL INDUSTRIES

Resistance Welding ELECTRODES
DIES • TIPS • WHEELS • HOLDERS

diffusion progressed to the stage where stoichiometric proportions were reached and a definite apatite structure was established. The composition-time-temperature dependence of particle growth was pointed out, and diffusion of activator ions into holes in the crystal lattice was shown to be related to the development of fluorescence.

New Mold Steel Offered

MANY intricate mold shapes can be hobbed in one operation, deeper impressions can be pushed with present equipment, and more accurate reproduction of hob design is possible with a new steel announced by Carpenter Steel Co., Reading, Pa. Known as Samson Extra, it is the result of many years of research and effort to develop an alloy steel which would provide excellent hobbing qualities plus good machinability with high core strength. The steel has a maximum Brinell hardness of approximately 105.

Field tests show that mold cavities made from the new steel have unusually high strength and resistance to sinking, because the yield strength of the steel when oil quenched is double the 38,000 psi of a good grade of hobbing iron. Average properties of the steel after case hardening are as follows:

	Oil Quench	Water Quench
Case Hardness—Rockwell:	C-64	C-65
Core Hardness—Rockwell:	C-20	C-25
Physical Properties Core—		
Tensile:	108,000	120,000
Yield:	69,000	91,000

Although the new steel is annealed for easiest hobbing, and is therefore soft, it machines very satisfactorily because of its analysis and control in manufacture.

Announces Scholarship Rules

NOW available is a 24-page booklet containing rules and conditions for the 1949-50 engineering undergraduate award and scholarship program of the James F. Lincoln Arc Welding Foundation, Cleveland. In addition to the rules and conditions for participation in the program by engineering undergraduates, the booklet also contains information about previous award programs and includes descriptions of some of the winning papers.

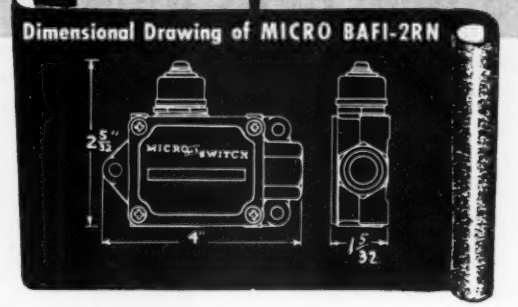
Suggested subject matter for student papers and a welding bibliography are also presented. There are 37 pictures taken from previous award papers which show some of the ideas on welding and its application for which awards have been made.

2 MICRO Precision Switches

Which combine high electrical rating with high inrush capacity

1. MICRO BAFI-2RN2 die cast enclosed switch with adjustable roller arm actuator. Both of these switches are available in right- and left-hand designs.

Dimensional Drawing of MICRO BAFI-2RN



2. MICRO BAFI-2RN die cast enclosed switch with plunger actuator. Note synthetic rubber seal boot which resists entrance of oil, moisture, dust, etc.

These two MICRO die cast enclosed switches offer plant engineers an ideal high-capacity precision switch to handle the high current inrush required in the operation of solenoids, motors and tungsten lamps.

These switches, available with either plunger or roller arm actuators, are Underwriters' listed for 1½ horsepower motor at 230 volts a-c; ¾ horsepower motor, 115 volts a-c; 20 amperes, 125, 250 or 460 volts a-c; tungsten lamp, 10 amperes, 125 volts a-c. They are rated for 75 amperes inrush capacity at voltages up to 460 volts a-c.

The rugged die cast housing insures protection against mechanical damage or shock. A synthetic rubber boot on the operating plunger and a cover plate ring gasket keep out dust, dirt, oil and moisture. Ample wiring space is provided within the housing. The switches are available in right- or left-hand designs for adapting to mounting requirements.

These high-capacity switches are typical of the many types and varieties of MICRO precision switches, housings and actuators, which plant engineers have found invaluable in modernizing present plant equipment to do a bigger job. For complete information on what MICRO SWITCH can do for you, call or write MICRO SWITCH, Freeport, Illinois, or contact the branch office near you.

©1949 First Industrial Corp.

MICRO MS SWITCH
TRADE MARK ®
A DIVISION OF FIRST INDUSTRIAL CORPORATION
FREEPORT, ILLINOIS, U.S.A.

MICRO . . . first name in precision switches

BRANCH OFFICES: Chicago • New York • Boston • Cleveland • Los Angeles
SALES REPRESENTATIVES: Portland • St. Louis • Dallas • Toronto

UNIVERSITY OF MICHIGAN LIBRARIES

INSULATING LADLE-TILTING MOTOR leads with "SCOTCH" Electrical Tape No. 27 at Griffin Wheel Corp., Chicago, Ill. Glass Cloth backing and Thermosetting Adhesive make this tape ideal for high-heat protection.

Scorching foundry heat can't harm wiring insulated with glass tape

After careful testing, Griffin Wheel Corp. in Chicago found "SCOTCH" Electrical Tape No. 27 gives dependable, economical, long-lasting protection under average foundry conditions.

This amazing tape is designed to solve your high-heat insulation problems. Its glass cloth backing will not burn, stretch, shrink or rot. Adhesive is tacky for easy application, thermosetting for firm bond in high temperatures.

LEARN MORE ABOUT THIS MONEY-SAVING TAPE BY WRITING DEPT. ST-119 TODAY FOR BOOKLET AND FREE SAMPLE.

QUICK FACTS ABOUT "SCOTCH" Electrical Tape No. 27

- **HIGH RESISTANCE**—won't burn, stretch, shrink or rot.
- **TOUGH**—high tensile strength.
- **NON-CORROSIVE** — contains no sulphur-bearing compounds.
- **REMEMBER** — for normal temperature conditions, "SCOTCH" No. 33 Electrical Tape — plastic-backed, does a thorough, permanent job.

REG. U.S. PAT. OFF.
SCOTCH BRAND
Electrical Tape No. 27

ANOTHER 3M COMPANY PRODUCT

Made in U. S. A. by **MINNESOTA MINING & MFG. CO.,** St. Paul 6, Minn.

also makers of other "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Sound Recording Tape, "UNDERSEAL" Rubberized Coating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.*
In Canada: CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

Flame Fabricating

(*Continued from Page* 128)

rection to be made quickly and easily and without moving the structure or member far out of its usual path through the shop.

Girder flange plates 2½ inches thick, for example, that are curled by the welding that connects them to the girder web can be made flat and square with the web by heating them along the center of their outer face with a large multiflame oxyacetylene torch moving along the girder at a speed at 6 to 12 inches per minute. Connection plates at the ends of beams and trusses can be similarly straightened and the flanges of wide-flange beams can be made square with the web by judicious heating. Experience in at least one plant has shown that the shrinkage effects of local heating can sometimes be used to straighten plates that would break if they were straightened by hammer blows or other mechanical means. It also has been demonstrated that excessive or improper application of heat shrinkage can tear steel apart.

Expansion of the nation's highway system promoted greatly the use of oxyacetylene flame. The motorist's demand that small bridges be practically unobservable as he crosses them has engendered the development of bridges made of long rolled beams cambered or curved vertically to fit the contour of the roadway. The cambering of large beams that is offered by the steel mills is not accurate enough for this use and it often does not fit the dimensions that are required by the engineering designs. It was natural, under these circumstances, for shop men familiar with the power of oxyacetylene flame to apply it to the job of providing accurate camber.

Cambering Beams — Basic principles of cambering beams by heat shrinking are well established. The beam is set upside down with supports under its ends only. Heat is applied to the uppermost flange (the flange which will be the bottom flange in service). The beam first arches upward under the influence of the expansion of heated metal, but as the flange cools the shrinkage that accompanies local heating will shorten the flange and the beam will curve downward toward the camber that is desired. Skill and experience are required to judge from the behavior of the beam, as it is heated, the amount of heating necessary to obtain the specified camber.

An early method of heating the flanges of beams to be cambered was to heat several zones about 3 inches wide across the entire flange so that

Choose One Type of Power Cable . . . Use it Three Ways

Pick Durasheath for power distribution: small size or large . . . one, two or three conductors . . . to carry from 0 to 5,000 volts. Then use this type in any installation you like: buried directly in the ground . . . in conduit . . . suspended from poles . . . or in a run that includes all three. Following are some of the characteristics of Durasheath that give it this versatility:

Durasheath is *unaffected by electrolysis*, corrosion and extremes in temperature.

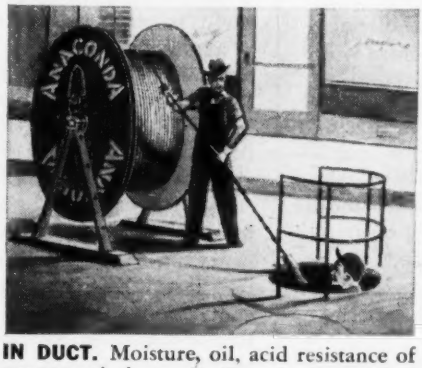
High resistance to oil, flame, abrasion, cutting, impact and the moisture, acids and alkalies found in the soil.

Light weight—greater strength.

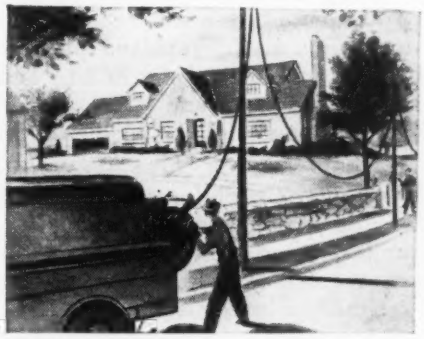
More flexible, easier to handle.

For power distribution between industrial plants, in street lighting systems, airports, mines, railroad signal systems, farm buildings and real estate developments—to mention a few—use Durasheath, the all-purpose cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 49421

UNDERGROUND. Toughness of neoprene jacket assures long life of Durasheath when installed directly in the ground.



IN DUCT. Moisture, oil, acid resistance of neoprene jacket make Durasheath an ideal cable for this application.



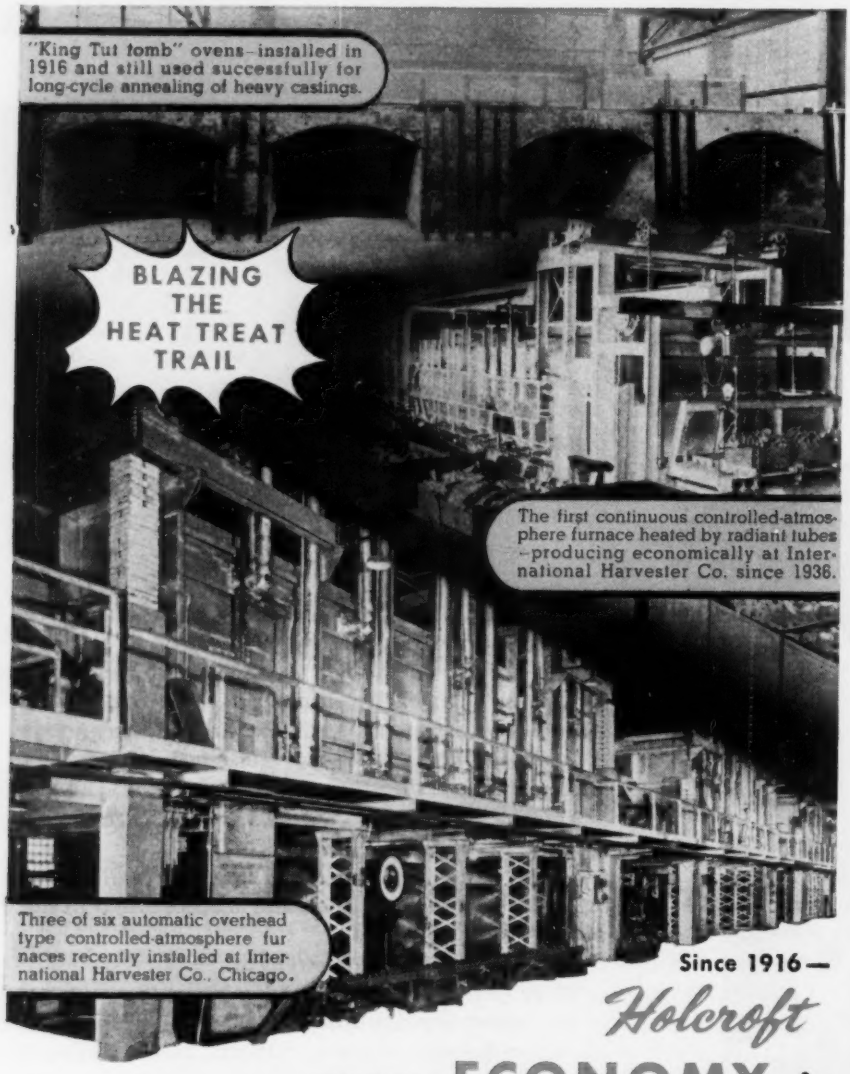
IN THE AIR. In single or multi conductors, Durasheath truly is a one-type cable for all-type use.

Anaconda **Durasheath**

ANACONDA
from mine to consumer

THE ALL-PURPOSE CABLE

UNIVERSITY OF MICHIGAN LIBRARIES


"King Tut tomb" ovens—installed in 1916 and still used successfully for long-cycle annealing of heavy castings.
BLAZING THE HEAT TREAT TRAIL
The first continuous controlled-atmosphere furnace heated by radiant tubes—producing economically at International Harvester Co. since 1936.
Three of six automatic overhead type controlled-atmosphere furnaces recently installed at International Harvester Co., Chicago.

Since 1916— *Holcroft*

means **ECONOMY** in

MALLEABLE ANNEALING

From the tomb-type ovens of 1916 to the latest high-production units, Holcroft furnace engineering has led the way to new economies in malleable annealing. The radiant-tube-heated, controlled-atmosphere furnace—introduced by Holcroft in 1936—replaced heavy work containers with light-weight trays, giving notable savings in time and fuel. The Holcroft overhead furnace design cut time and labor to a new low; and we can cite many other advantages provided by Holcroft trail-blazing.

Holcroft furnace design is based on *complete metallurgical and engineering service*. We design each furnace for its individual application, selecting *without bias* the elements best suited to the job; and in so doing, we constantly develop improved features and processes. As a result, Holcroft furnaces meet every production requirement *at minimum over-all cost*—for malleable annealing and for *every other* heat treating process.

For these reasons, it will pay you to have us quote on your next heat treating installation. We cordially invite your inquiries.

SINCE 1916 *Holcroft* AND COMPANY

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

6545 EPWORTH BLVD. DETROIT 10, MICHIGAN

CHICAGO 3
C. H. MARTIN, A. A. ENGELHARDT
1017 PEOPLES GAS BLDG.

CANADA
WALKER METAL PRODUCTS, LTD.
WALKERVILLE, ONTARIO

HOUSTON 1
R. E. McARDLE
5724 NAVIGATION BLVD.

the steel was at bright red heat throughout its thickness. In this scheme the weight of the beam was a major factor in upsetting the heated metal and the number of zones heated largely governed the amount of camber produced. The cambered shape was a broken curve of straight segments with a small but sharp bend at each heated zone. The scheme was satisfactory for cambering beams with very wide flanges that were only 14 to 16 inches deep, but it was not effective for larger beams, even when weights were set on the beam to increase the upsetting of the heated zones.

It has been found, however, that this general idea can be made effective for large beams if the heated zones of the flange are extended over a distance equal to half the depth of the beam and if the web at each zone is simultaneously heated in a triangular area extending from the heated zone of the flange to the center of the web. This is still a fairly common method of heating beams to camber them but it is rather slow and expensive.

Heating Flanges — Searches for faster and more economical schemes for heating the flanges of beams and for means of producing smoothly curved cambers led to the use of longitudinal heating of the beam flanges to subcritical temperatures. Initial trials of this scheme were made with extremely large multiflame heating torches and with the heated zones intermittent along the length of the flange. Recent work, however, has been with torches of about 250 cu ft per hour capacity making continuous lines of heat. Control of the amount of heat supplied is gained primarily by skillful adjustment of the speed at which the torch travels, but secondary control is had from adjustment of the size of the flames and distance from torch tips to work. Number and arrangement of the torches across the beam flange are chosen to suit the dimensions of the beam being cambered.

One shop has recently cambered a large number of 16-inch wide-flange beams with 2¾-inch camber in 40 feet. Another shop has obtained a camber of 11 inches in 36-inch wide-flange beams 80 feet long. Cambers of 1½ or 2 inches can be put into beams with less than 1 hour's work by a single workman. Camber or curvature of only part of the length of a beam can be provided if it is needed and, by heating the upper and lower sides of each flange simultaneously near one edge, beams can be curved laterally to fit engineering or architectural requirements.

Paint Characteristics — Develop-

ment of new types of paint vehicles 10 to 15 years ago was a prime factor in creating a new use for the oxyacetylene flame. The new paints had different drying characteristics than the paints traditionally used in the structural industry and they required more thorough cleaning and drying of the steel surfaces before the initial or prime coat of paint was put on. Experiments with steel that had been warmed just before it was painted showed promising results and the oxyacetylene flame was put in use to provide similar conditions on steel in structural shops. Special comb or ribbon burners were developed, with particular attention being directed to providing the highest possible flame velocity and intensity that is attainable.

Industrial Hygiene Book

CONTRIBUTIONS from leading industrial hygiene experts, covering both general and specific subject matter, are included in the second of a two-volume work *Industrial Hygiene and Toxicology,* edited by Frank A. Patty, in charge of General Motors Industrial Hygiene Department. Published by Interscience Publishers Inc., New York, the book has nine chapters authored by the editor, a former industrial hygiene expert for the U.S. Bureau of Mines.

Subject matter includes techniques for good industrial hygiene administration and such factual material in the form of tables, charts, diagrams and analysis on various environmental factors affecting industrial workers. These include gases, dusts, vapors and fumes; solvents; x-rays, gamma rays or radioactive materials; abnormal temperatures and humidities; plant lighting; noise intensity; various industrial raw materials and their by-products; skin inflammations; ventilation and personal respiratory protection devices.

Heater Improves Product

ELIMINATION of almost all rejects, improvement in the product and reduction of production costs has resulted from the installation of an electronic induction heater for the brazing of beater-blade assemblies for portable mixers in the plant of Hunter Spring Co., Lansdale, Pa. Rated at 20 kw output at 530 kc, the heater, made by General Electric Co., Schenectady, N. Y. was installed in 1947 and is said to have reduced production cost by 1 cent per unit or about $36 per day.

Six beater blade subassemblies are inserted into a jig in the induction brazing operation. Flux and a small

"PACK-BEARERS"
...fine for jungle trails.. but costly in your handling operations

MECHANIZE material handling—release manpower for production operations—and you cut excess material handling costs—speed production.

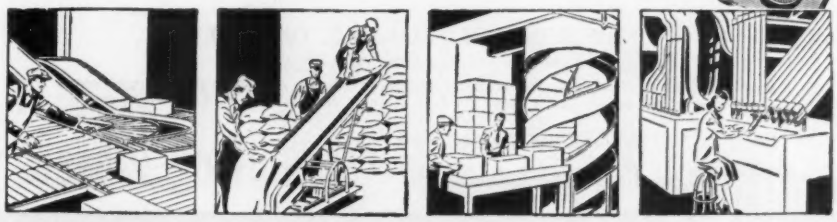
Wherever packages, parts, or units are handled—loose or in containers—there is a type of Standard Conveyor (gravity or power, roller, belt, slat, chain, wheel —portable unit) expressly designed to do each particular job best.

Standard Conveyor is nationally known as a reliable source for conveying equipment of wide range, versatility and flexibility. The answer to your specific needs in cost-cutting, time-saving conveyors can be found at Standard.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

Standard
GRAVITY & POWER
CONVEYORS

Send for Standard's General Catalog — see how conveyors are used to best advantage in every field of industry. Ask for Bulletin ST-119.



ROLLER · BELT · SLAT · CHAIN CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

UNIVERSITY OF MICHIGAN LIBRARIES

These drawn cabinet tops—960 of them in 8 hours—for Lincoln's new "FLEET-ARC" welders also make a gasoline tank when welded together

Increased output, higher quality performance, lower labor and maintenance costs—add them up and this H-P-M Fastraverse Press shows annual savings of $60,000 on one job alone for Lincoln Electric Company!

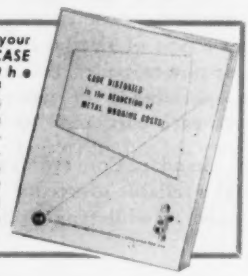
This is just one of the many jobs this versatile H-P-M Press performs. It forms heavy metal sections which replace castings. It coins parts that replace forgings—parts formerly purchased outside. As a result, many machining operations are eliminated, cutting Lincoln's costs and improving their competitive position.

For YOUR Protection

Take a tip from Lincoln Electric! Install H-P-Ms for deep-drawing, forging, die straightening, coining, forming and assembling operations. H-P-M presses are completely self-contained, all-hydraulic — easy to install, quick to set up, simple to operate, low on upkeep.

Ask an H-P-M engineer how you can save money with H-P-M presses, or write for the facts today.

Write today for your free copy of "CASE HISTORIES in the REDUCTION of METAL WORKING COSTS". It tells how manufacturing costs are being reduced in many prominent production plants by H-P-M pressure processing.



THE HYDRAULIC PRESS MFG. COMPANY
1044 Marion Road, Mt. Gilead, Ohio

Branch Offices in New York, Philadelphia, Detroit, Pittsburgh and Chicago. Representatives in other principal cities. Export Dept: 500 Fifth Avenue, New York, N.Y. Cable—"Hydraulic"

HPM — *All-Hydraulic Self-Contained* Metal Working Presses

REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

square of silver brazing alloy are placed on each subassembly where the four points of the blade come together. After the beater stem is placed over this point and locked into position, the jig indexes the beater assemblies into the work coil of the heater. Blade-stem joints are brazed first, after which the heater automatically brazes the batter guards to each stem.

Heating cycle for the brazing operation on six beaters at one time is 11 seconds for the blade-stem joints, a ¼-second delay, and 12 seconds for brazing the batter guards to the stems. Hunter reports that an average of 1800 beater blades for brazed per 8-hour shift. When the heater is not being used on these assemblies, it performs special annealing and brazing operations on springs and stampings made by the company. Many of these operations are on work which was previously turned down.

Washer-Drier is Rapid

VARIETY of sizes of cylindrical cans may be washed or dried, or both, at the rate of 300 per minute by a compact and efficient machine requiring a space of 3 x 7 feet. The Rex Roto-Brush machine, developed by Chain Belt Co., of Milwaukee, Wis., consists of a preliminary conveyor, main conveyor, rubber roll, brush, and two motors. It requires no operator for normal operation.

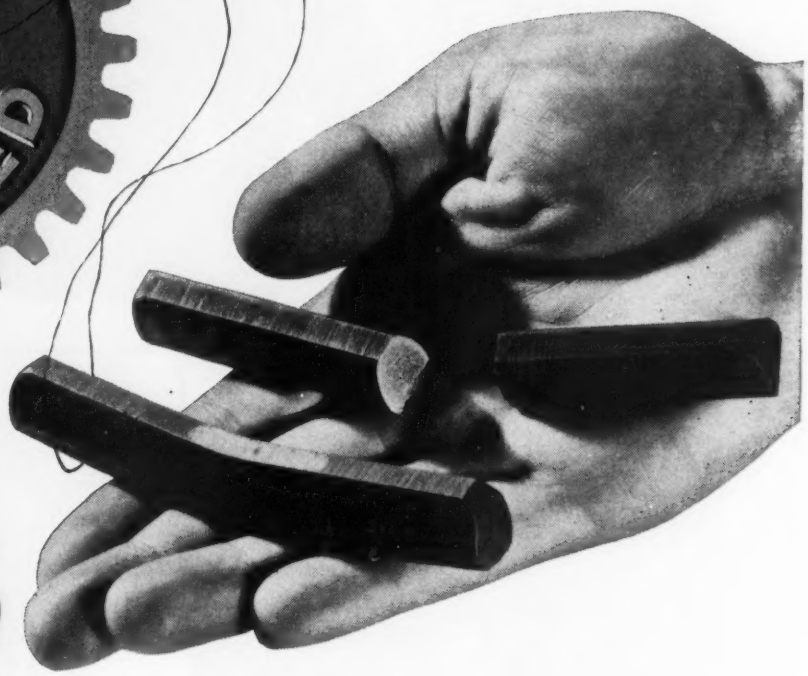
Preliminary feeding conveyor carries cans through a spacing worm to the main conveyor which places them horizontally on a hardened stainless steel bar between the rubber roll and the brush. After the scrubbing operation, the brush removes most of the water from the can so that it leaves the machine only slightly damp. An adjustable stripper blade removes surplus water from the brush. When the can reaches the end of the brush, it is automatically returned to an upright position and placed on the next conveyor ready for the following step in the processing line.

Chemical Melts Snow and Ice

PRODUCED in the form of minute pellets is a 99 per cent active chemical for the melting of snow or thawing of ice. Developed by Chem Industrial Co., Cleveland, the product, known as Melt, is said to have a thawing capacity per pound of 12 pounds of salt. If used at the start of a storm, it will melt the subsequent snow falls and it will leave no residue.

YOU CAN BE SURE.. IF IT'S
Westinghouse

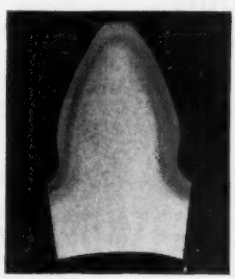
TAPER-HARDENED



Hard and Tough

this "taper-hardened" tooth bends before it breaks

Taper-Hardened Tooth Section



Case-Hardened Tooth Section

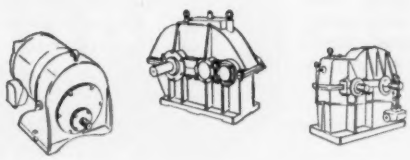
The taper-hardened tooth above bent under the same force that snapped the case-hardened tooth. Yet a test will show wearing surfaces of nearly equal hardness.

The cross sections at the left show why taper-hardened gears have resilience and life under their hard surfaces—why they last longer in punishing service—why they "roll with the punch". Notice the graduated hardness in the taper-hardened tooth—blending down the scale from maximum hardness at the surface to toughness at the ductile core. Compare it with the thin, brittle, shell-like hardness of the case-hardened tooth in which there is no give, no bend.

No wonder "taper-hardened" BP gear steel makes gears last so long.

For complete information on taper-hardening, write for free copy of "BP Gear Steel" B-4395, Westinghouse Electric Corp., Dept. 1111, P. O. Box 868, Pittsburgh, Pa.

J-07276



Westinghouse
GEARED DRIVES
MEMBER OF AGMA
WESTINGHOUSE W

UNIVERSITY OF MICHIGAN LIBRARIES

Improved quality control of metals at **LOWER COST**

SPERRY ULTRASONIC REFLECTOSCOPE

Reflectoscope, Type UR, Style 50E351.

Provides rapid accurate non-destructive testing of steel and other metals

Metals tested by the Reflectoscope are preferred by users who cannot afford lost machine and man hours. The expense of lost work on faulty metals and possibility of service failures are minimized when potentially harmful defects are located before fabricating or machining.

The cost per test is low because it is instantaneous. The operator touches the quartz-crystal Searching Unit to the surface and immediately "sees" through the metal. Discontinuities are revealed on the Reflectoscope screen and are located accurately. For full details write for new Bulletin 50-105.

- CONTROLLED SENSITIVITY —can be adjusted to meet quality control standards.
- PORTABLE UNIT — can be set-up quickly by one man.
- TESTS PARTS "IN PLACE" —locates fatigue cracks in shafts, rolls, axles and other stressed parts. Operates on 100-130 volt, 60 cycle current.

SPERRY REFLECTOGAGE. Measures thickness of metals and other materials by resonance at ultrasonic frequencies. Accuracy within 2%. Full details in Bulletin 3700.

SPERRY PRODUCTS, INC.
DANBURY, CONN.

Sperry

SP-159

LETTERS *to the Editors*

Lubricant Speeds Drawing

In your Nov. 8, 1948 issue, you published, on page 102, an article entitled, "Wire Drawing Speed Increased 25 Per Cent". This article mentions "Banox" employed as a lubricant. We shall thank you to inform us where it can be purchased.

J. Bonnet
Iron & Nonferrous Metals
Technical Association
Paris, France

Details on Banox may be obtained from Calgon Inc., 1934 Hagen Bldg., Pittsburgh, Pa.—The Editors

Savings in Packaging

The issue of Sept. 19, has an article entitled "Packaged Savings", on page 45. We would appreciate more detailed information on this new idea.

E. Y. Bready
Director of Purchases
Standard Pressed Steel Co.
Jenkintown, Pa.

Packaging methods used by National Screw & Mfg. Co. and other fastener producers, enable the users of National's products to save at least 5 per cent by reducing stock handling, warehousing and shipping expense. Technique involves use of many separately wrapped, small packages packed in one large carton. The small packages can be removed without repacking the entire carton when filling a small order.—The Editors

Fundamentals Articles

I am wondering whether or not you have the articles on electric furnaces, written by Walter M. Farnsworth, Republic Steel Corp., Massillon, O., which appeared in your magazine several months ago, compiled in book form. If so, I would appreciate your mailing me a copy.

C. A. Kral, Asst. General Manager
In Charge of Operations
Rolling Mill Division
Newport Steel Corp.
Newport, Ky.

These articles and others in the Fundamentals of Steelmaking series are available in reprint form from STEEL's Readers' Service Department. Upon conclusion of the series, all will be included in one book called, "The ABC of Iron and Steel".—The Editors

Over 2 Years Ago

Two or three years ago you had an article describing a new super high speed punch press for blanking small parts, such at 1½-inch round washers, at rates of 4000 to 8000 per minute. It wasn't a conventional punch press design but both top and bottom dies were mounted on eccentrics which moved the dies along with the continuous feed on the material which feed was at a regular rate

Make HARPER your SINGLE SOURCE

for non-ferrous and stainless steel fastenings.

Only Harper carries large stocks of **6,000 DIFFERENT ITEMS** *in from* **3 TO 10 DIFFERENT METALS!**—*the widest assortment of bolts, nuts, screws, washers, rivets and accessories available from* **ONE SOURCE** *in a great variety of dimensions, threads, heads and sizes.* **BRASS · BRONZES · COPPER · MONEL AND STAINLESS STEELS**

Convenient Warehouse Service for prompt delivery to any point in the country.

Specials made to order from ample stocks of raw materials.

Wire or phone your requirements to nearest Branch Office.
Complete 134-page color catalog gladly sent upon request.

HARPER

THE H. M. HARPER COMPANY

General Offices and Plant: Morton Grove, Ill. (Suburb of Chicago)

New York Office and Warehouse — 200 Hudson Street, New York 13.
Los Angeles Office and Warehouse—835 East 31st St., Los Angeles 11.

BRANCH OFFICES: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Milwaukee, Oakland, Philadelphia, Pittsburgh, St. Louis, Seattle, Toronto (Canada).

EVERLASTING FASTENINGS

UNIVERSITY OF MICHIGAN LIBRARIES

Just Another HOPPER APPLICATION!

DETROIT POWER SCREWDRIVER
***MOTORIZED* HOPPER UNIT**
attached to conventional type TAPPING MACHINE

Here is another example of the wide versatility of this unit . . . Steel stampings are automatically selected and fed to air-operated index and dial for tapping operation, after which the parts are automatically ejected, entirely eliminating manual handling of parts. This application is just as readily adaptable to drilling or punch press operations.

The hoppers are completely motorized, and are self-contained units. They are made in six sizes: 8", 10", 12", 16", 24" and 30" diameters.

Submit samples for quotation

DETROIT POWER SCREWDRIVER CO.

2811 W. Fort Street
DETROIT 16, MICH.

without stopping. We believe the press is being made by a company down in the Cleveland, O., area and would like to know the name of the company.

George C. Price
President
Electrical Mfg. Co.
Battle Creek, Mich.

We believe you are referring to an article that appeared in the July 14, 1947 issue of STEEL. Manufacturer of the press mentioned is Lempco Products Inc., Bedford, O.—The Editors

Request To Reprint

Will you please grant Carnegie-Illinois Steel Corp., Duquesne Works, permission to reproduce for distribution to supervisors and apprentice welders the article entitled, "Safety Precautions in Arc Welding," which appeared in the April 25, 1949, issue of STEEL.

A. L. Norman, Superintendent
Industrial Relations
Carnegie-Illinois Steel Corp.
Duquesne, Pa.

Permission granted.—The Editors

Reprints Dept.

We are desirous of obtaining a reprint of an article, "Hardening Capacity of Engineered Metal Castings," which appeared in your Feb. 21, 1949 issue.

E. C. Wallace
Metallurgist
Barber-Colman Co.
Rockford, Ill.

In the April issue of *Metals Review*, I have noticed an abstract of the article, "Operation of Statistical Quality Control in a Steel Mill," which was written by W. T. Rogers and appeared in your March 14, 1949, issue. It would be greatly appreciated if you could send me tear sheets on this article.

Howard O. Schmidt
Aluminum Co. of America
Cleveland, O.

My attention has just been called to a series of articles beginning in May 2nd issue of STEEL on the subject of "Production of High Temperature Coke Plants", written by Philip S. Savage, vice president of Donner-Hanna Coke Co. of Buffalo, N. Y. Would you please send me a reprint of these articles?

Walter L. Slifer, Chief
Statistical & Research Section
Bituminous Coal Institute
Washington, D. C.

In your March 22, 1948, issue you published an article entitled, "Injury in Ground Surfaces," by Leo P. Tarasov. Would it be possible to mail me a copy of this article? One of our foremen is interested in reading same.

V. A. Wallace
Secretary to Resident Manager
New Departure Division
General Motors Corp.
Meriden, Conn.

Reprints of all of the articles are being sent.—The Editors

NEW, IMPROVED WIRE

For Manufacturing Recessed Head Screws

R. S. Simmons
Chief Metallurgist
Keystone Steel & Wire Co.

A new process has been developed by R. S. Simmons, chief metallurgist of Keystone Steel & Wire Company, that results in an improved wire stock for manufacturing recessed head screws. This unique process starts with the steel that is later drawn into the wire stock. The surface of the steel stock is improved to such an extent that it is comparable in characteristics to that found in the best of high grade bars.

Advancement Over Normalizing Process

The process is a refinement and advancement of the normalized process. In air-tight vessels the steel stock is heated under the action of controlled atmospheres to produce a structure and surface necessary to withstand the severe and drastic cold upsetting of wire to be made for recessed heads of all types. After this special heat treatment, the stock is drawn through a special lubricant to an intermediate wire size and then carefully annealed in process before the final drafting to the desired final wire size.

Available in 12 Grades of Steel

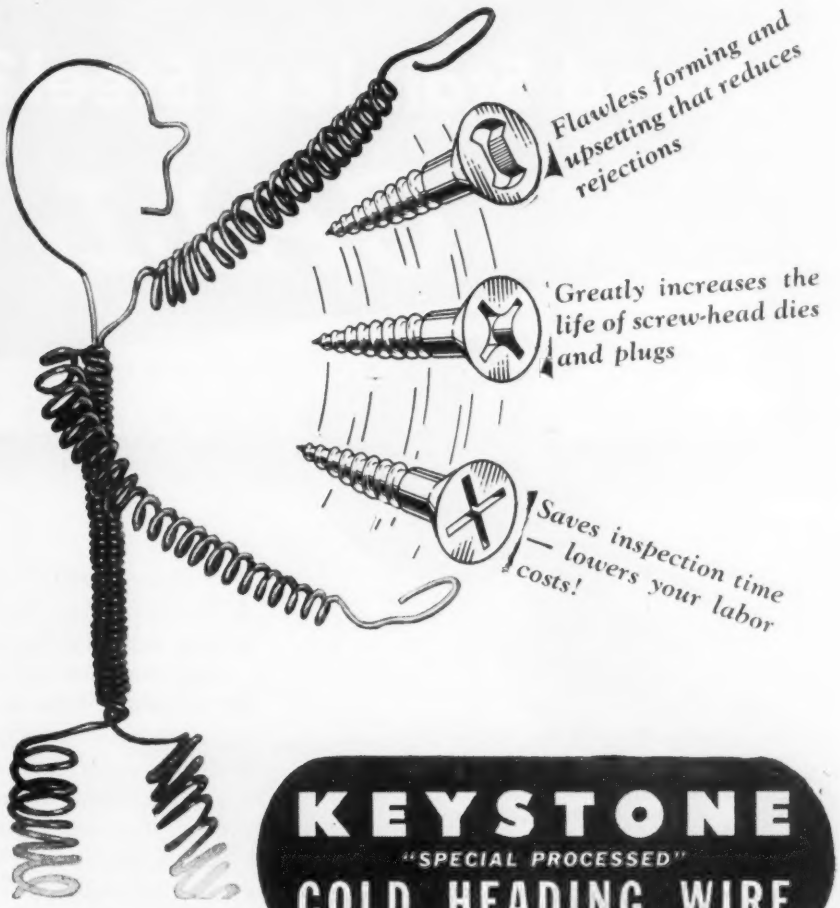
Keystone's new wire for recessed head screws is furnished in the following steel grades:

C-1006	C-1016
C-1008	C-1017
C-1010	C-1018
C-1012	C-1019
C-1013	C-1020
C-1015	C-1022

It can be used in the cold upsetting of round, flat, oval, fillister, truss, binding, pan, hexagon, and slotted recessed Phillips and Clutch Head Machine Screws, Sheet Metal Screws, Cut Screws, and Self-Tapping Screws.

Many Advantages

The cold heading industry benefits greatly from this new wire developed by Keystone . . . in increased life of dies and plugs, in reduced rejections, in less machine down time, and in savings of cost of expensive final inspection as well as a better finished product.


Flawless forming and upsetting that reduces rejections
Greatly increases the life of screw-head dies and plugs
Saves inspection time — lowers your labor costs!

KEYSTONE
"SPECIAL PROCESSED"
COLD HEADING WIRE

For recessed heads, Keystone's new special-process wire delivers the desired upsetting and die forming qualities with such a high degree of uniformity that finished product rejections are practically eliminated . . . individual inspection of screws is no longer necessary . . . die and plug life are often more than doubled. This new wire effects considerable savings in the production of Phillips head, clutch head and cross recessed head screws.

Keystone is prepared to help solve any of your industrial wire problems. If special treatment is called for, Keystone's metallurgical research and testing facilities are available to supply the answers. We welcome your inquiry.

KEYSTONE
STEEL & WIRE CO.
PEORIA . . . ILLINOIS

Special Analysis Wire, Setting New Standards of Performance

Advertisement

UNIVERSITY OF MICHIGAN LIBRARIES

Need Stainless Steel?

CALL US!

IT's always wise to "Call Us" when you need stainless steel. For it's a fact that *U·S·S* Stainless Steel is "tops" in quality, dependability and proven excellence.

Right now our stocks include No. 2B Finish Sheets and No. 4 Finish Sheets of uniform quality. Also bars, meeting high standards of machinability; plates up to 120″ wide and 360″ long . . . as well as welded and seamless tubing, pipe, angles, channels, welding electrodes in all standard grades and specifications are on hand for your needs.

So call our nearest warehouse or sales office. You'll get prompt, courteous service. Meanwhile, why not fill in and return the convenient coupon for our free booklets on U·S·S Stainless Steel? Do it now.

UNITED STATES STEEL SUPPLY COMPANY — USS STEELS — SERVICE

Symbol of Service for Steel Users

United States Steel Supply Company
Dept. F-119, 208 S. La Salle St., Chicago 4, Ill.

Without obligation on our part, please send us FREE booklets on U·S·S Stainless Steel as checked below:

☐ Introduction to Stainless Steel ☐ Fabrication of Stainless Steel

Name.....Title.....

Firm Name.....

Address.....

City.....Zone.....State.....

UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO
CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH
PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY, MO. · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

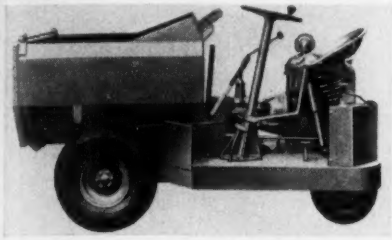
USS

UNITED STATES STEEL

New Products and Equipment

Bulk Handling Truck-Tractor

Besides handling bulk materials in its 2/3-yard capacity dump body, the Kal-Truk, designed by Kalamazoo Mfg. Co., Kalamazoo 24F, Mich., is available with a platform body equipped with all-steel side and end gates which are removable. It has a



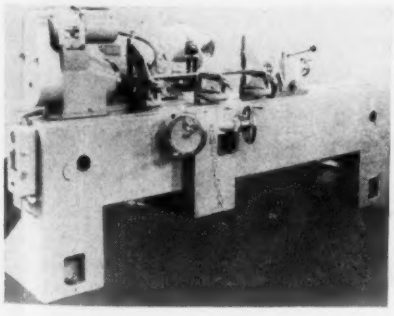
three-speed forward and reverse drive and is operated like a tractor. Direct discharge of materials from hoppers, bins or mixers into its dump body is possible. It is rear steering and is capable of speeds up to 15 mph.

Dump body is standard. Platform body has a tilting feature which facilitates quicker removal of load. Powered by a 13 hp air-cooled motor, it has a load carrying capacity of 3000 pounds.

Check No. 1 on Reply Card for more Details

Sharpens Broaches Accurately

Incorporating advantages of mounting the broach between centers on a stationary bed and traversing the grinding wheel from tooth to tooth for faster and more accurate resharpening is the cylindrical broach resharpening machine offered by American Broach & Machine Co., Ann Arbor, Mich. It can be used to



resharpen internal broaches such as involute splines, helical splines, hexagon, cam-shaped, irregular formed, serration and combination type. Micrometer dial control wheels for the lateral traverse of carriage and infeed of grinding spindle, variable speed drive for rotation of broach, antifriction bearing rollers and hardened and ground carriage mounting rails are features of the machine.

Two sizes are available for the resharpening of round type broaches, the RBS-9-84 for broaches up to 9 inches in diameter and up to 84 inches long and the RBS-9-60 for broaches up to 9 inches in diameter and 60 inches long.

Check No. 2 on Reply Card for more Details

Coil Cradle for Punch Press

Designed for increased efficiency in the use of coil stock with punch press operation are Easy Load automatic coil cradles manufactured by Rowe Tool & Die Co., 1506 N. Industrial Blvd., Dallas, Tex. Unit may be moved from press to press by one man and may be loaded to capacity without auxiliary equipment. A width adjustment crank positions

separator plate and adjustment from minimum to maximum width can be made in less than 1 minute. Motor driven rollers are used for supporting and feeding coil stock.

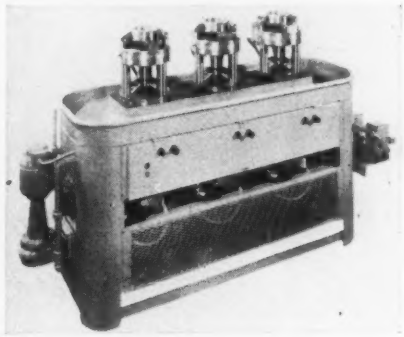
Smallest of the two motor driven cradles weighs 300 pounds, has a single-phase ¼-hp motor and handles coil stock up to 36 inches OD and up to and including 10 inches wide. The 330-pound large model has a single-phase ½-hp motor and handles coil stock up to 40 inches OD and up to and including 10 inches wide. Maximum rate of speed of both is 90 fpm.

Check No. 3 on Reply Card for more Details

Uses Collapsible Taps

Designed to handle collapsible taps ranging in size from 1½ to 4 inches is the Tapmaster No. 40 automatic tapping machine, manufactured by D. H. Prutton Machinery & Tool Co., 5295 W. 130th St., Cleveland, O. Taps are actuated by a cam which allows a rise after the tapping operation so that the facing or chamfering of the lower surface of the work can be accomplished by tools attached directly to the tap. In this way, an operation usually performed separately is done during the tapping cycle.

Use of collapsible taps in this type of work steps up production and eliminates abrasion occurring dur-

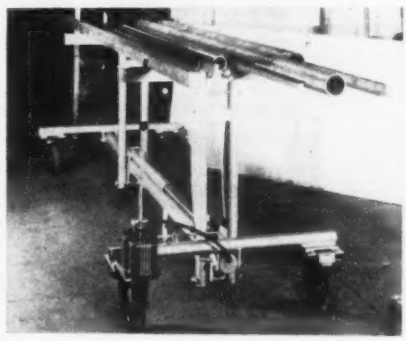


ing the threading out process. Work holding air fixtures are custom-made for each individual job. Fixtures clamp the work before the tap enters, hold it during the tapping and facing operation and release it when the work is completed.

Check No. 4 on Reply Card for more Details

Elevator Serves as Truck

Lance Co., 102 W. Fowler St., Milwaukee 3, Wis., is manufacturing the Mobile-Draulic lift, a combination hydraulic elevator and hand-operated four-wheel truck. Use will reduce materials handling time by placing metal sheets, bars, rods, etc., adjacent to fabricating machines. Regardless of the working height of machines, load on the lift is easily



moved and adjusted to that height. Elevating power is obtained through a hand-operated hydraulic pump.

Lift may be stopped at any position within its 32-inch travel. Heavy steel tubular stock, angles and plates are incorporated in the construction. Swivel casters or any type wheels can be mounted. Should a stationary

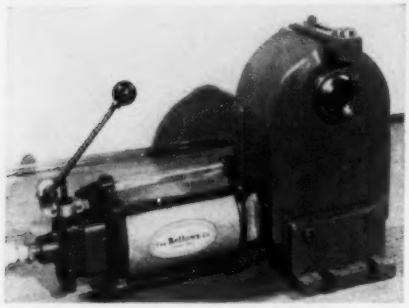
UNIVERSITY OF MICHIGAN LIBRARIES

lift be desired, wheels are removed and a platform placed on the cross arm. Overall width and length are 4 and 11 feet, respectively, and capacities offered are 500, 2000, 4000 and 6000 pounds.

Check No. 5 on Reply Card for more Details

High Thrust Collet Chuck

Developing a thrust 10 times the operating air line pressure is the heavy-duty BZC-10 controlled-air-power collet chuck introduced by Bellows Co., 222 W. Market St., Akron



9, O. Holding power is sufficient to withstand severe types of drilling, tapping and milling without the part or work piece slipping or twisting in the collet. An almost universal chuck, it will handle most standard collets with stock clearances up to 1⅜ inches. With an optional adaptor unit it will handle almost any standard externally-threaded draw type collet.

Unit is designed with a "dead man" safety control so that in the event of air pressure failure, it will hold securely; air pressure must be applied before the work can be released. Mounting may be in any position. Ample chip clearance is provided at the base.

Check No. 6 on Reply Card for more Details

Greater Capacity Bridge Crane

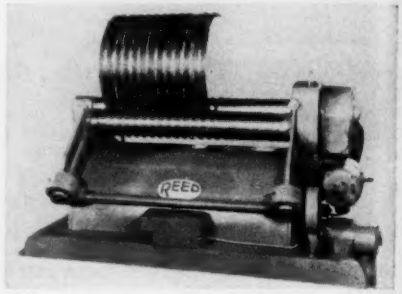
Greater hook load capacity is obtained through reduction of dead weight and improved wheel, track and bearing design of crane end truck and hoist trolley wheels incorporated in the Tramrail crane of floating suspension design, announced by Forker Corp., Cleveland 6, O. Use of swiveling crane end trucks and flexibly suspended runways eliminate the possibility of binding. Further ease of operation is obtained by length of end truck wheelbase which is selected so that the bridge span will not exceed eight times the end truck wheelbase.

Maximum headroom is obtained through use of underslung, single-girder bridge construction. End truck and trolley wheels are of high-strength cast iron with deep-chilled tread and flange.

Check No. 7 on Reply Card for more Details

Adjustable Corrugation Rolls

Equipped with three corrugated shafts which can be designed to fit any standard type of corrugation, the series 600 corrugated roll machine introduced by Reed Engineer-



ing Co., 1003 West Fairview Ave., Carthage, Mo., will roll sheets which have previously been corrugated into circular and semicircular forms. It is equipped with power adjustment on the rear forming roll which establishes the curvature of the sheet.

An air-operated drop end permits

STEEL

Giant Tuna Clippers built by Avondale

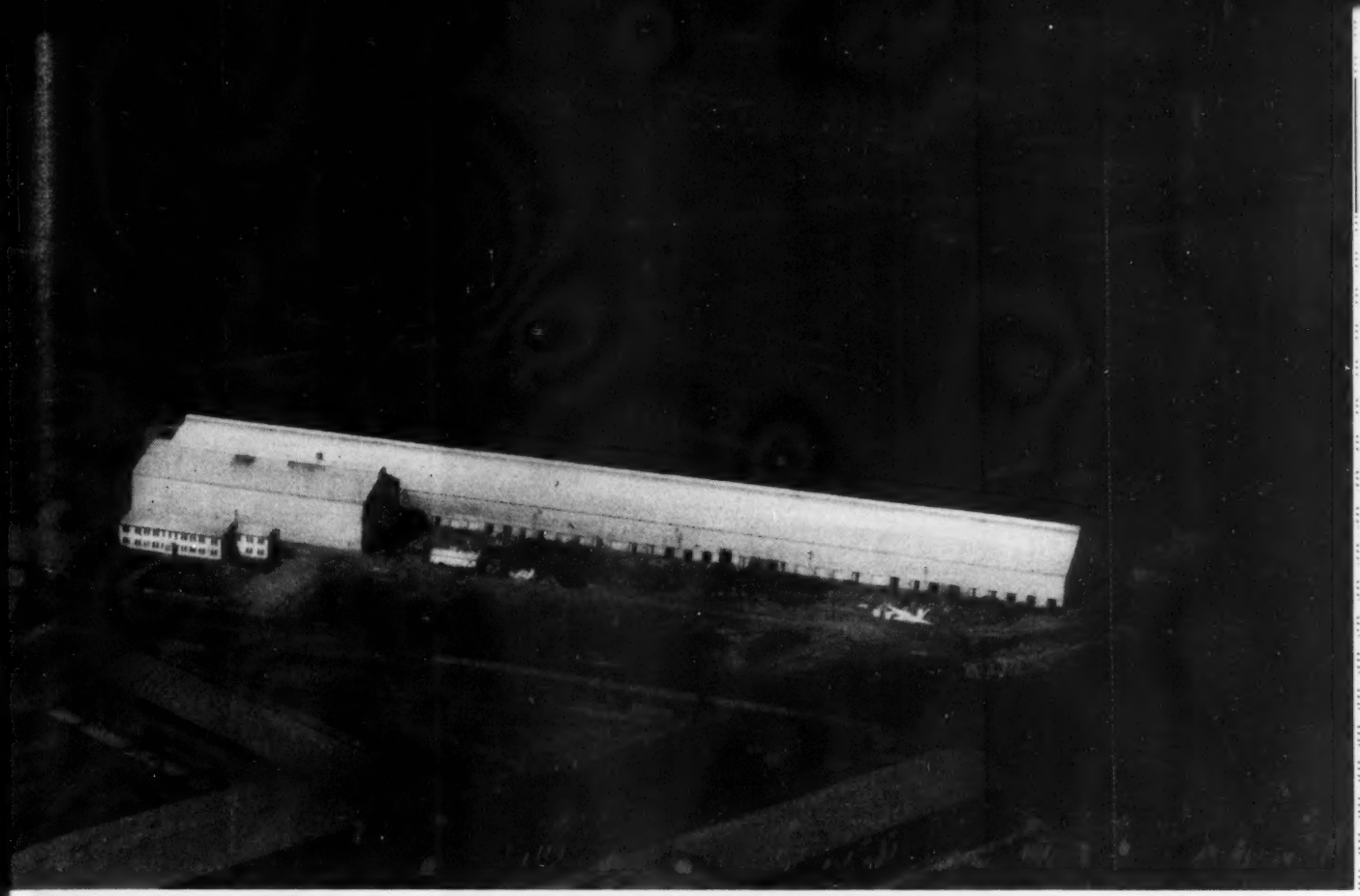
IS THE HEART OF

Giant Dredges built by Avondale

SHIPBUILDING & REPAIRING

Avondale Marine Ways, INC.

MAIN PLANT: AVONDALE, LA. QUICK REPAIR PLANT: HARVEY, LA.



Location of the Aluminum Alloy Division, Vanadium Corporation of America, near Chester, Pa. Leased from War Assets Administration.

NEW SOURCE OF ALUMINUM-RICH ALLOYS
FOR THE ALUMINUM AND STEEL INDUSTRIES

Our Aluminum Alloy Division, with headquarters at Chester, Pa., has begun commercial production of aluminum-rich alloys to serve the aluminum industry and to supplement the deoxidizers we have supplied for many years to the steel industry. The grades and compositions offered are:

FOR STEEL

Grade 1 . . . . . 95 to 97% Aluminum
Grade 2 . . . . . 92 to 95% Aluminum
Grade 3 . . . . . 90 to 92% Aluminum
Grade 4 . . . . . 85 to 90% Aluminum

Ingots, notch bars, shot, grain and special shapes —for deoxidation and grain size control.

FOR ALUMINUM

Vanadium-Aluminum . . . . . 2½, 5 and 10% V
Titanium-Aluminum . . . . . 2½ and 5% Ti
Silicon-Aluminum . . . . . 5 to 20% Si

For alloying, for grain refinement, and for improving the mechanical properties and fabricating qualities of numerous aluminum alloys.

Careful supervision of manufacture in the largest electric furnace ever built for the melting of aluminum, combined with close spectrographic control, assures quantity production of quality material.

Write us for details as to how these products can serve you

MAKERS OF ALLOYS — VANCORAM — CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

UNIVERSITY OF MICHIGAN LIBRARIES

why starve your automatics...

FOLLANSBEE COLD ROLLED STRIP feeds right from the coil into your automatic machines. There's real efficiency and time-saving economy in the continuous supply of presses, roll-formers, and other automatics. These high-speed machines need never starve for material because you can feed Follansbee Cold Rolled Strip directly from the coil.

making gadgets for gourmets?

FOLLANSBEE COLD ROLLED STRIP is manufactured in a range of tempers, and with the proper finish, for making turners, mixers, beaters, and a myriad other profitable specialties. Custom-made Follansbee Cold Rolled Strip, in continuous coils, is furnished to your specifications. You should be taking advantage of the machining quality of Follansbee Cold Rolled Strip and Follansbee Polished Blue Strip. Just call the Follansbee Steel Representative nearest you.

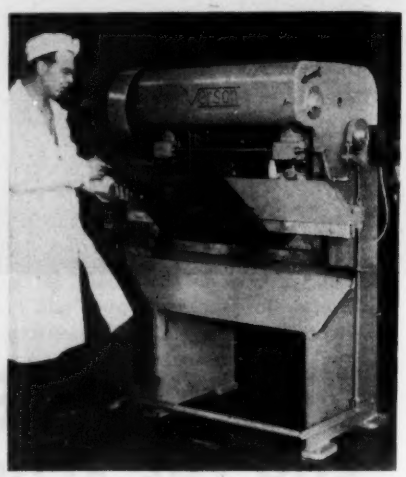
FOLLANSBEE STEEL CORPORATION
GENERAL OFFICES, PITTSBURGH 30, PA.
COLD ROLLED STRIP • ELECTRICAL SHEETS • POLISHED BLUE SHEETS
SEAMLESS TERNE ROLL ROOFING
Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, St. Louis, Kansas City, Nashville, Houston, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada.
Plants—Follansbee, W. Va., and Toronto, Ohio.
Follansbee Metal Warehouses—Pittsburgh, Pa., Rochester, N. Y., and Fairfield, Conn.

quick removal of fully rolled circles. Top shaft automatically raises when the drop end is lowered for the removal of such work. Equipped with bronze bearings throughout, the machine has a totally enclosed silent worm gear drive. Main driving motor is 5 hp and auxiliary motor for adjusting rear roll is 1½ hp.

Check No. 8 on Reply Card for more Details

Small Power Press Brake

Suitable for most types of metal forming operations is the power press brake with bed and ram length of 48 inches, offered by Verson Allsteel Press Co., 9318 S. Kenwood Ave., Chicago 19, Ill. Rated air bending capacities range from 48-inch lengths



of 16 gage stock, over a ½-inch opening, to 24-inch length of 10 gage stock, over a 1⅛-inch opening.

Unit all steel construction is employed in the model 16-48 unit to assure perfect alignment and maximum rigidity. All gears are steel with machine cut teeth. A totally enclosed friction clutch and self-releasing band brake are employed. Eccentric and intermediate shafts are mounted in solid renewable bronze bushings. Variable speed arrangement provides for 20 to 50 strokes per minute. The press may be mounted on casters.

Check No. 9 on Reply Card for more Details

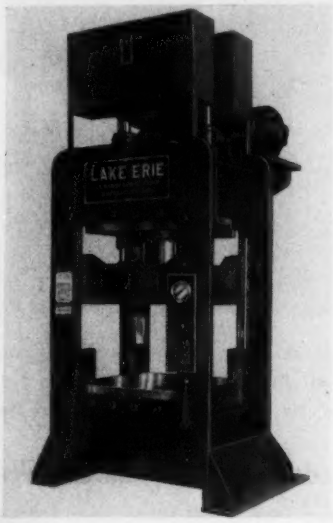
Presses for Varied Operations

Offered in capacities of 100, 150 and 200 tons, series DF standard hydraulic metalworking presses, built by Lake Erie Engineering Corp., Buffalo 17, N. Y., may be adapted for drawing, forming, straightening, bending, coining, and various other shop operations.

Available with or without cushion, presses, in each of the tonnages, can be furnished in four combinations: Single-action normal-speed, with hand-lever operation; single-action with cushion, normal-speed,

hand-lever operation; single-action with high-speed pushbutton operation; single-action with cushion, high speed pushbutton operation.

Operation is governed by the pressure-control hand wheel, operating lever, motor controls, and a hydraulic gage mounted on the instrument panel. Both the main cylinder and pull-

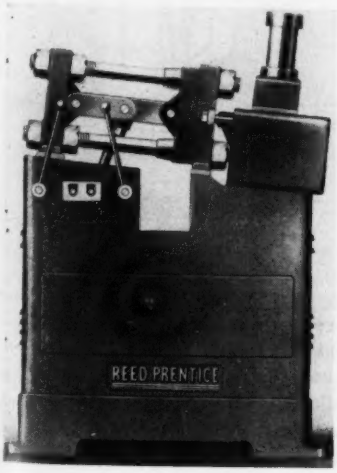


back cylinders are single-action designed. Moving platen is guided against steel tension plates by adjustable gibs. Main ram is cast from special grade close-grained cast iron, then is machined, rolled, and polished.

Check No. 10 on Reply Card for more Details

Die Casting Machine

Having a maximum shot capacity of 1 pound of zinc, the model No. O self-contained die casting machine, made by Reed-Prentice Corp. of Worcester 4, Mass., is capable of pro-

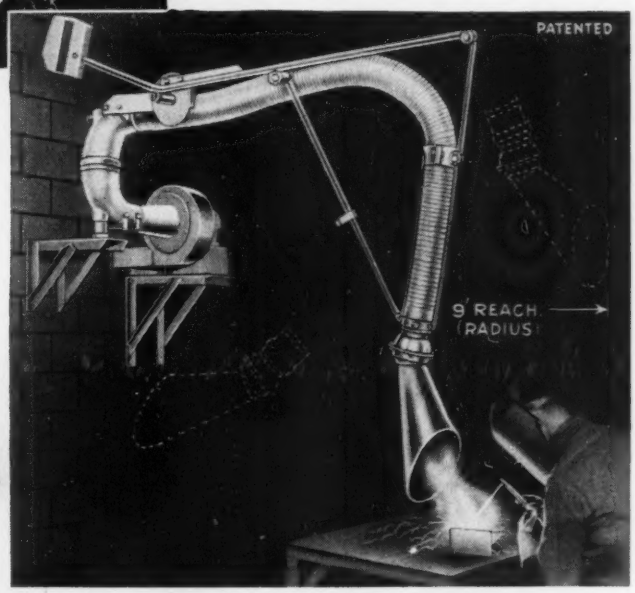


ducing up to 600 shots per hour. Such small pieces as knobs, handles, gears and fittings may be cast of lead, tin or zinc base alloys.

Machine is manually operated by hydraulic pilot valve control levers.

RUEMELIN Welding Fume Collector

Welding without ventilating snout. Note smoke clouds and poor vision. Gases and heat surround operator's helmet.



Collecting Welding Fumes with a Ruemelin Fume Collector.

REMOVES WELDING FUMES *at the Source!*

Solve your welding fume problem efficiently by installing Ruemelin Welding Fume Collectors. They produce a powerful suction that removes smoke, gas and heat at the source. Guards employee health, resulting in less welder fatigue. Clears shop air with minimum heat loss. Covers maximum welding area vertically, horizontally and by circle swing. Made in 9 ft. and 15 ft. reach sizes. Shipped assembled, easy to install. Thousands in practical service. Free engineering service for your installation.

Write for our New Bulletin 37-D and list of users — just off the press.

RUEMELIN MFG. CO.

3882 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS • SAND BLAST AND DUST COLLECTING EQUIPMENT • WELDING FUME COLLECTORS

A 5580-2/3A

UNIVERSITY OF MICHIGAN LIBRARIES

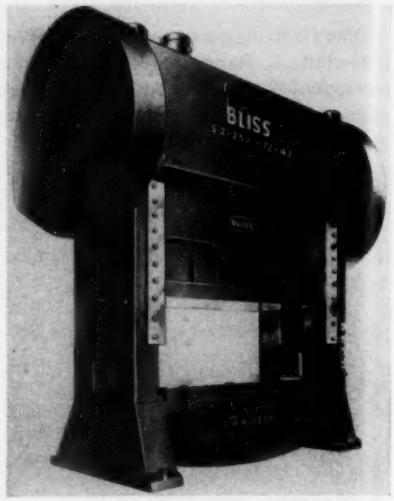
Maximum casting area at 1300 psi is 9 square inches with adequate casting area provided by die plates measuring 10 x 10 inches. Holding pot has a capacity of 75 pounds of zinc.

Check No. 11 on Reply Card for more Details

Multi-Operation Presses

Used for such operations as blanking, cutting, punching, shaping, stamping, embossing and drawing and drawing and forming work are new lines of straight side single and double crane presses developed by E. W. Bliss Co., Toledo, O. Conforming to Joint Industry Conference standards, they have tonnage and weight capacities and bed and slide areas which are slightly larger. Box-type crowns and slides are reinforced by deep internal ribs.

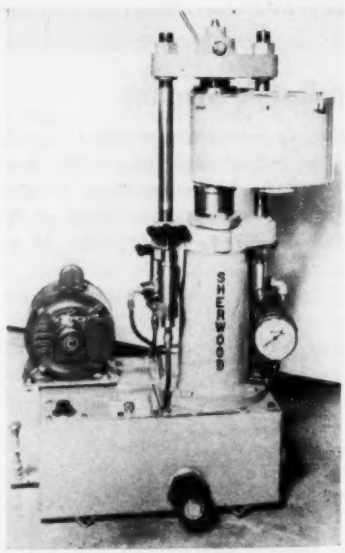
Barrel type slide adjustment permits long adjustment to accommodate dies varying greatly in height. All press frames are of the four-piece tie rod construction and are of Meehanite castings. Slides and gibs are longer for precision guiding of die into work. Single end drive presses with capacities up to and including 250 tons have a new type of pneumatic friction clutch mounted on the crankshaft. Power adjustment of slide is standard equipment on all presses.



Check No. 12 on Reply Card for more Details

Production Wax Injection Press

For volume production of wax patterns for industrial precision castings is the Sherwood heavy-duty wax injection press offered by Alexander Saunders & Co., New York, N. Y. Wax is extruded by direct piston drive activated by a hydraulic pump. Wax pressure may vary from 100 to 1500 psi. The wax is contained in cylinders carried in a revolving drum; while the wax is being discharged from one cylinder, it is being tempered for future use in the other cylinders.



Revolving drum may contain four or five wax cylinders. Electric strip heaters in a 10-gallon oil tank heat the wax. Temperature is controlled to within 2° F plus or minus. Range is to 400° F. For low pressure work,

Your confidence in a stamping source is an item we can't buy—but *we can earn* it! You see, buyers of small to medium-large stampings across the nation have *solid reasons* for the trust they place in us—and we invite you to join this distinguished clientel. If your products require coining, as well as blanking, piercing, forming, drawing—or close tolerances—or are suitable for automatic or progressive press operations—we're sure you'll profit from an association in which you find

- **35 years of dependability, promises well-kept**
- **Broad experience, including extensive tool-engineering "know-how"**
- **Wide scope of production from a modern plant and equipment**
- **Cooperative material sources and devotion to quality and service**

Our new booklet "Stampings", describes our plant, over 75 presses and other equipment and the range of our production. Please write for your copy and the name of our Stampings Sales Representative in your area.

DETROIT STAMPING COMPANY
359 Midland Avenue Detroit 3, Michigan

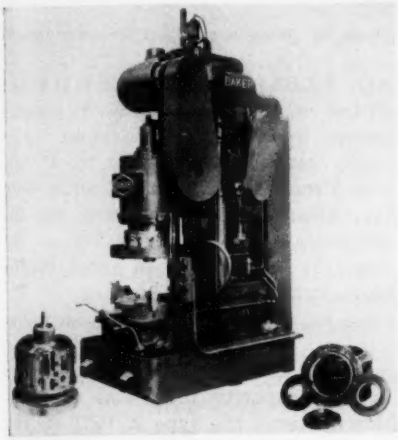
Manufacturers of famous De-Sta-Co Toggle Clamps, Arbor Spacers, Shims, Shim Stock, Blower Housings, Refrigerator Compressor Valves.

the die may be held manually against the nozzle. Clamps or press arrangements can be made to lock the die in position for injection.

Check No. 13 on Reply Card for more Details

Ups Pipe Flange Productivity

Operating time in boring, reaming, threading and counterboring cast iron pipe flanges is reduced by the number 30H04 machine developed by Baker Brothers Inc., Toledo, O. It is equipped with a 3-jaw scroll and chuck and will handle all size flanges from 3 to 16-inch pipe size. Murchey special full receding pipe taps with



quick-change chasers and reamer blades perform the operations in rapid succession. A worm and worm gear drive head is arranged with sliding gears to provide two speeds plus pick-off speed change gears.

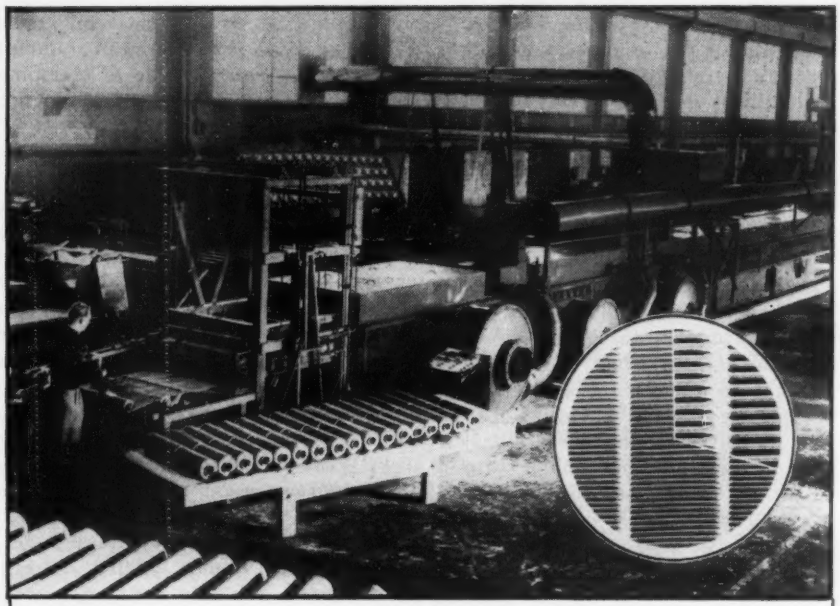
In operation the saddle rapidly advances through hydraulic feed pressure to a predetermined point where taper reaming operation begins. A half nut closes, providing lead screw feed of saddle for reaming, tapping and counterboring operation. At completion of operations, the half nut opens and the saddle is rapidly returned to raised position by hydraulic pressure.

Check No. 14 on Reply Card for more Details

Utility Storage Boxes

Utility storage boxes of the type built by North American Industries Inc., 2100 N. Kolmar Ave., Chicago 39, Ill., may be handled by fork lift tractors as well as by overhead cranes and hand-operated pallet bed trucks. Units have four-side utility with truck lifting forks, strong bottom construction, self-positioning stacking lugs, four corner lifting hooks and 64 cu ft capacity. Construction is of 12-gage hard temper steel with arc-welded joints.

Typical uses are in the storing and segregation of materials, as furnace charging boxes with rotating fork



The Alodizing installation at Permanente's Trentwood, Washington plant. Kaiser Aluminum Shade Screening (shown in inset) excludes insects and, venetian-blind-wise, deflects the rays of the sun thus reducing room temperatures as much as 15° F. without interfering with air circulation.

This screening is produced by the Permanente Metals Corporation and sold by Permanente Products Company to screen manufacturers, distributors and dealers throughout the nation.

Alodized* **ALUMINUM**
provides
Kaiser Aluminum SHADE SCREENING
WITH MAXIMUM PROTECTION

Kaiser's new departure in screening, shown above, utilizes "Alodine"—the new development in metal protection. "Alodine" greatly increases the natural weather resistance of aluminum and reduces reflectivity by masking aluminum's metallic luster with a pleasing shade of green.

Alodizing is a purely chemical process—not an electrolytic one—and involves no elaborate apparatus. The coating solution is applied rapidly, uniformly and at low cost. Spray, dip, and even brush processes make Alodizing available to all kinds of installations; and manufacturers of aluminum are Alodizing on a huge scale at their mills to supply Alodized sheets and coils to plants lacking facilities for treating the metal.

"Alodine" promotes economy in production; and protects the quality of finished aluminum products. Insist on Alodizing and Alodized aluminum in your own fabrication. Write to us for further information on "Alodine".

* "Alodine" Trade Mark Reg. U. S. Pat. Off. by The American Chemical Paint Company.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING
Deoxidine *
Peraline *

PICKLING ACID INHIBITORS
Rodine * ®

Pioneering Research and Development Since 1914
AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA.
Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

UNIVERSITY OF MICHIGAN LIBRARIES

lift tractors, for storage and shipment of castings and machined parts and interplant storage and shipment of turnings, borings, chips, etc.

Check No. 15 on Reply Card for more Details

• • •

PERFORMS SOLDERING OPERATIONS: Superheat gun grip alcohol Blotorch, announced by Lenk Mfg. Co., Boston 15, Mass., will produce a flame of over 2700° F. This enables it to perform silver soldering, brazing and sweat fitting work as well as soft soldering operations. A built-in safety stand enables torch to be set in various positions on a work bench.

Check No. 16 on Reply Card for more Details

CONTROL VALVE: Quick reversibility of action is a feature of the Stabilflo valve offered by Foxboro Co., Foxboro, Mass. In a few minutes and without the use of special tools, valve can be changed from air to open to air to close, or vice versa. It is not necessary to remove it from its installation or shut down controlled flow.

Check No. 17 on Reply Card for more Details

FOR CONTROL USE: Ward Leonard Electric Co., Mount Vernon, N. Y., announces Bulletin 110 multipole Midget magnetic relays designed for general and special purpose control use. Typical applications include machine tool, alarm, heater, etc.

Check No. 18 on Reply Card for more Details

WELDS STAINLESS: Sureweld portable spot welder, introduced by National Cylinder Gas Co., Chicago 11, Ill., will weld stainless and mild steel up to 1/8-inch combined thickness. It operates on 220 v ac lines, single phase, 50/60 cycle.

Check No. 19 on Reply Card for more Details

LOAD BINDER: For easy and safe binding of heavy industrial loads on trucks and trailers, American Forge & Mfg. Co., Pittsburgh 12, Pa., introduces a new ratchet-type load binder. Weighing 13 pounds with a barrel length of 10 inches, it has a full 8-inch takeup, allowing load to be retightened at any time enroute without having to release tension or readjust chain.

Check No. 20 on Reply Card for more Details

CLAMP: Hunter Spring Co., Lansdale, Pa., announces the Neg'ator clamp that features automatic takeup, constant clamping pressure regardless of thickness of object held, enormous dimensional range between clamp heads, flexibility in locating clamping pressure and coil form head or jaws. It is offered in standard sizes that cover a range of clamping pressures from 2 ounces to 20 pounds in eight increments.

Check No. 21 on Reply Card for more Details

ADJUSTABLE ON THE JOB: A line of fractional and small horsepower clutches is announced by Centric Clutch Co., Cranford, N. J. Each clutch is adjustable by the user right on the job. Pulley type clutches can accommodate several standard sizes of pulleys.

Check No. 22 on Reply Card for more Details

POWER-SAVING TREAD: A new line of aluminum core rubber tread industrial wheels in 6, 8 and 12-inch sizes are introduced by Bassick Co., Bridgeport, Conn. Called Alcore, they have a highly resilient power-saving rubber compound tread.

Check No. 23 on Reply Card for more Details

PORTABLE ELECTRIC DRILL: Fasco Industries Inc., Rochester, N. Y., offers a portable electric drill with a rated capacity up to ¼-inch in steel and ½-inch in wood. Universal motor operates on 110-120 v, ac or dc, 1600 rpm no load speed.

Check No. 24 on Reply Card for more Details

REPAIRS SILICA BRICK: General Refractories Co., Philadelphia, Pa., offers a new mortar, Grefco Silbrik Bond, for use in construction with silica brick and for repairs to all silica brick construction, particularly in open hearth, electric furnaces and in glass tanks.

Check No. 25 on Reply Card for more Details

TOOL HOLDER: Known as Redy Rigid, tool holder clamps carbide bit against work surface with maximum rigidity by a lock block, screw and lock nut arrangement which will not work loose. Developed by American Die & Tool Co., Reading, Pa., it is available for round, square, rectangular and triangular bits of all standard sizes.

Check No. 26 on Reply Card for more Details

CLEANER: Enthone Inc., New Haven, Conn., has developed a new type surface preparational material called Surprep for cleaning surfaces prior to organic finishing. It may be used full strength or diluted with water and applied by brushing or wiping. It contains oil-displacing chemicals and phosphating and other rust removing chemicals.

Check No. 27 on Reply Card for more Details

STRAIN INDICATOR: A new SR-4 self-balancing, dial type strain indicator for use in stress analysis with SR-4 bonded resistance wire strain gages is announced by Baldwin Locomotive Works, Pittsburgh 19, Pa. It may be used with single strain gage or with multipoint switching and balancing units for reading strain points. Available with any one of three ranges, with any two, or with all three ranges.

Check No. 28 on Reply Card for more Details

WELDER CONTACTOR: Size OW 50 amp welder contactor was designed by Square D Co., Milwaukee 12, Wis., for small spot welding machines up to 10 kva, 220 v, or 20 kva at 440 v. Two double break contacts connected in series assure high rupturing capacity.

Check No. 29 on Reply Card for more Details

NO LUBRICATION NEEDED: Fitted with oil-impregnated porous bronze bushing, a new flange type pillow block is announced by Precision Products Division, Atlanta Tool Co., Atlanta, Ga. Block will run indefinitely without lubrication or oil drip. It is available in shaft diameters from ½ to 1¼ inches.

Check No. 30 on Reply Card for more Details

SAFETY SWITCH: Designed for use in high capacity industrial distribution systems, the type A HCI switch made by Trumbull Electric Mfg. Co., Plainville, Conn., has a new arc quenching design and actuating mechanism. It is made in 30, 60 and 100 amp sizes.

Check No. 31 on Reply Card for more Details

CUTTING TOOLS: Designated as Lucky 13, a new series of cutting tools is offered by Plew Tool & Metal Heat Treat, Columbia City, Ind. Bits and blades have a hardness of C 66-68 and a tensile strength of over 300,000 psi.

Check No. 32 on Reply Card for more Details

MANUALLY OPERATED STARTERS: A new line of starters for alternating current motors up to 7½ hp is announced by General Electric's Control Divisions, Schenectady 5, N. Y. Designed for use on small pumps, blowers and grinders, it is furnished in both toggle and pushbutton types in 2, 3 and 4-pole forms, size 0 and 1.

Check No. 33 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

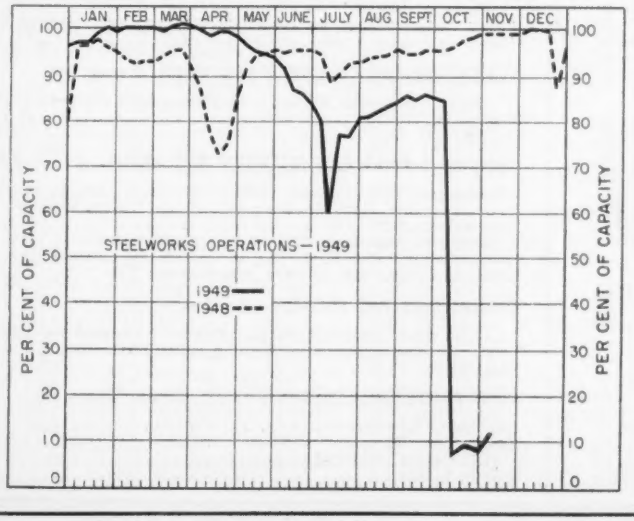
SCARCITY STEEL market, especially in flat-rolled products, looms for the next five to six months. Metalworking shops' inventories are depleted, or so badly unbalanced, it will take that long to restore full supply-demand equilibrium after the strike ends. Probably 9 million tons of ingot production will be lost from 1949 output by the work stoppage. Complicating the outlook is the coal strike. Lacking assurance of adequate fuel supply, some steelworks may not promptly resume operations upon strike termination. Extensive furnace repairs also may be a stumbling-block to quick snap-back to pre-strike levels. This will serve to intensify tight supply conditions. Indicative of the seriousness of the outlook, some automotive companies already are nibbling at the conversion market for stop-gap tonnage.

LABOR—While the steel strike is heading into its closing stages, some time may elapse before complete settlement. Much depends on union policy with the separate producers. Optimism in steel and metalworking is checked by the fact the Bethlehem agreement, which the union seeks to make standard, may be difficult for many companies, especially the smaller ones with limited resources and lacking pension plan experience. Consequently, settlements may lag in a number of instances.

PRODUCTION—Speed with which steelmaking operations are restored to pre-strike levels, 86 per cent of capacity, depends upon time required for actual settlements with the separate producers; physical state of steelmaking equipment; adequacy of fuel and furnace repair supplies. Raw materials in general, scrap, ore, limestone, are adequate. Some steelworks and blast furnaces can resume quickly once the go-ahead signal is given. Bethlehem Steel will be back to pre-strike levels at some plants by mid-week, about 10 days after it settled. Rotary Electric Steel Co. got back into production within one day after it signed up. Generally, resumption time will vary among producing units and it is unlikely normal operations can be regained until several weeks after the strike.

OPERATIONS—Steelmaking picked up last week following Bethlehem's settlement, the estimated national ingot rate rising 3 points to 12 per cent of capacity. District rates rose 21½ points to 30 per cent in eastern Pennsylvania. 11½ points to 91.5 in St. Louis, and 6 points to 52 in Cincinnati. The Pittsburgh rate eased 1½ points to 2, reflecting addition of one producer to the list of strike-idled. Steady gain in the rate is anticipated in step with completion of separate pension agreements. Meanwhile, metalworking is jolted severely by the steel shortage. Some plants are on curtailed schedules and further cutbacks are in prospect. Steel is not likely to begin flowing from the mills in sufficient volume in time to prevent projected metalworking curtailments.

PRICES—Naturally, with steelmaking costs in for another upward nudge prices are being watched closely. Whether the increased costs will be passed along to consumers in higher prices is a moot question, however. There is yet no sign a general increase is on the way, although producers expect the pension-insurance settlement to raise costs $4 a ton. Premium-priced material is appearing in the market and high-priced conversion deals are in the making so that some increase in steel costs to consumers is certain. Scrap prices advanced on a broad front last week, largely reflecting stronger broker-dealer sentiment. STEEL's composite for steelmaking grades advanced to $28 from $26.67 the week preceding. Pig iron composites held unchanged as follows: Basic, $45.60; No. 2 foundry, $46.10; malleable, $47.27. Finished steel arithmetical composite held steady at $91.64, as did STEEL's weighted finished steel index at 152.52.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Nov. 5	Change	Same Week 1948	Same Week 1947
Pittsburgh	2	— 1.5	96	101
Chicago	5.5	— 0.5*	99	94.5
Eastern Pa.	30	+21.5	95	93.5
Youngstown	0	None	105	92
Wheeling	61	None	91	86
Cleveland	0	None	99.5	90.5
Buffalo	0	None	104	88.5
Birmingham	6	None	100	99
New England	58	None	90	86
Cincinnati	52	+ 6	106	91
St. Louis	91.5	+11.5	89.5	80
Detroit	37	None	100	89
Western	21.5	None	..	..
Estimated national rate	12	+ 3	99	96

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. *Change from revised rate.

UNIVERSITY OF MICHIGAN LIBRARIES

Composite Market Averages

	Nov. 3 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	152.52	152.52	152.52	151.86	99.16
Index in cents per lb ..	4.132	4.132	4.132	4.114	2.686
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$91.64	$91.64	$91.55	$95.05	$56.73
No. 2 Fdry Pig Iron, GT	46.10	46.10	46.10	46.69	23.67
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.41	24.29
Basic Pig Iron, GT.....	45.60	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	28.00	26.67	27.58	43.25	16.00

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Nov. 3 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh ...	3.35	3.35	3.35	3.35-.55	2.15
Bars, H.R., del. Phila. ...	3.83	3.83	3.83	3.79	2.47
Bars, H.R., Chicago	3.35	3.35	3.35	3.35	2.15
Bars, C. F., Pittsburgh	3.95-4.00	3.95-4.00	3.95-4.00	3.95-4.25	2.65
Bars, C.F., Chicago	4.00	4.00	4.00	4.00	2.65
Shapes, Std., Pittsburgh ..	3.25	3.25	3.25	3.25-.30	2.10
Shapes, Std., Chicago	3.25	3.25	3.25	3.25	2.10
Shapes, del. Phila.	3.50	3.50	3.50	3.48	2.215
Plates, Pittsburgh	3.40	3.40	3.40	3.40-.60	2.10
Plates, Chicago	3.40	3.40	3.40	3.40	2.10
Plates, Coatesville, Pa. ..	3.50	3.50	3.50	3.75	2.10
Plates, Sparrows Point, Md.	3.40	3.40	3.40	3.45	2.10
Plates, Claymont, Del.	3.50	3.50	3.50	3.95	2.10
Plates, del. Phila.	3.59	3.59	3.59	3.71	2.15
Sheets, H.R., Pittsburgh ..	3.25	3.25	3.25	3.25-.30	2.10
Sheets, H.R., Chicago	3.25	3.25	3.25	3.25	2.10
Sheets, C.R., Pittsburgh ..	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Chicago	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh ..	4.40	4.40	4.40	4.40	3.50
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25-.70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25-.30	2.10
Strip, C.R., Pittsburgh ...	4.00	4.00	4.00	4.00-.75	2.80
Strip, C.R., Chicago	4.00-.15	4.00-.15	4.00-.15	4.00-.25	2.90
Strip, C.R., Detroit	4.20-.25	4.20-.25	4.20-.25	4.20-.50	2.90
Wire, Basic, Pittsburgh ...	4.15	4.15	4.15	4.15-4.50	2.60
Nails, Wire, Pittsburgh ...	5.15	5.15	5.15	5.15-6.30	2.55
Tin plate, box, Pittsburgh.	$7.75	$7.75	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$61.00	$61.00	$61.00	$61.00	$40.00
Sheet bar, mill(NT)	51.78–52.00	51.78–52.00	52.00–53.57	67.00	34.00
Wire rods, $\frac{7}{32}$-⅜", Pitts. ..	3.40	3.40	3.40	3.40-4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.17	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.67	25.84
No. 2 Fdry, Birmingham..	39.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.09	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	135.00

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..	$29.50	$29.00	$29.75	$42.75	$16.50
No. 1 Heavy Melt. E. Pa..	25.00	23.50	25.00	41.50	15.50
No. 1 Heavy Melt. Chicago	29.50	27.50	27.00	41.75	16.50
No. 1 Heavy Melt. Valley	29.25	29.25	31.25	42.75	16.25
No. 1 Heavy Melt. Cleve...	26.50	26.00	26.50	42.25	15.25
No. 1 Heavy Melt. Buffale.	27.25	27.25	28.25	48.25	16.75
Rails, Rerolling, Chicago..	44.50	41.50	41.50	64.50	22.25
No. 1 Cast, Chicago	41.50	41.50	41.50	70.50	20.00

COKE, Gross Ton

Beehive, Furn., Connlsvl. .	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.75	15.75	15.75	17.00	7.75
Oven, Fdry, Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	17.62½-18.50	17.625	17.625	23.50	12.00
Zinc, E. St. Louis	9.75	9.50	9.25	15.50	8.25
Lead, St. Louis	12.80	12.80	14.05	21.30-.35	6.35
Tin, New York	94.00	95.00	96.00	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	38.50	38.50	14.50
Nickel, refinery, duty paid	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del.	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham,Ala. R2, S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston, del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
So.Chicago,Ill. Y1	46.00	46.50	46.50	....
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron, del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg., del.	....	54.20	....	....
LosAngeles,SanFrancisco,del. ...	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts.N.&S. sides,Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

• Low phos, Southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorous: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$59.50
Buffalo H1	60.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2.....	77.00
Keokuk,Iowa, OH & Fdry, 12½ lb, piglets, frt. allowed K2..	82.00
Wenatchee,Wash. OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.00
Steelton,Pa. B2	51.00
Philadelphia delivered	51.09
Troy,N.Y. R2	51.00

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

Semifinished and Finished Steel Products

Mill prices as reported to STEEL Nov. 3, 1949; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)

Detroit R7 .....$50.00
Munhall,Pa. C3 .....50.00

INGOTS, Alloy (NT)

Detroit R7 .....$51.00
Houston,Tex. S5 .....59.00
Midland,Pa. C18 .....51.00
Munhall,Pa. C3 .....51.00
So.Duquesne,Pa. C3 ...51.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. C3 .....$52.00
Clairton,Pa. C3 .....52.00
Conshohocken,Pa. A3 ..57.00
Ensley,Ala. T2 .....52.00
Fairfield,Ala. T2 .....52.00
Fontana,Calif. K1 .....71.00
Gary,Ind. C3 .....52.00
Johnstown,Pa. B2 .....52.00
Lackawanna,N.Y. B2 ..52.00
Munhall,Pa. C3 .....52.00
Sharon,Pa. S3 .....52.00
So.Chicago,Ill. C3 .....52.00
So.Duquesne,Pa. C3 ...52.00

Carbon, Forging (NT)

Bessemer,Pa. C3 .....$61.00
Buffalo R2 .....61.00
Canton,O. R2 .....61.00
Clairton,Pa. C3 .....61.00
Cleveland R2 .....61.00
Conshohocken,Pa. A3 ..63.00
Detroit R7 .....61.00
Ensley,Ala. T2 .....61.00
Fairfield,Ala. T2 .....61.00
Fontana,Calif. K1 ....80.00
Gary,Ind. C3 .....61.00
Geneva,Utah G1 .....61.00
Houston,Tex. S5 .....69.00
Ind.Harbor,Ind. I-2 ...61.00
Johnstown,Pa. B2 .....61.00
Lackawanna,N.Y. B2 ..61.00
Munhall,Pa. C3 .....61.00
So.Duquesne,Pa. C3 ...61.00
So.Chicago,Ill. C3, R2..61.00
Warren,O. C17 .....61.00

Alloy (NT)

Bethlehem,Pa. B2 ....$63.00
Buffalo R2 .....63.00
Canton,O. R2, T7.....63.00
Conshohocken,Pa. A3 ..65.00
Detroit R7 .....63.00
Fontana,Calif. K1 ....82.00
Gary,Ind. C3 .....63.00
Houston,Tex. S5 .....71.00
Johnstown,Pa. B2 ....63.00
Lackawanna,N.Y. B2 ..63.00
Massillon,O. R2 .....63.00
Midland,Pa. C18 .....63.00
Munhall,Pa. C3 .....63.00
Sharon,Pa. S3 .....63.00
So.Chicago,Ill. C3, R2..63.00
So.Duquesne,Pa. C3 ...63.00
Warren,O. C17 .....63.00

SHEET BARS (NT)

Mansfield,O. E6..(GT)$58.00
Portsmouth,O. P12 ....52.00
Sharon,Pa. S3 .....52.00

ROUNDS, SEAMLESS TUBE (NT)

Canton,O. R2 .....$76.00
Cleveland R2 .....76.00
Ind.Harbor,Ind. I-2 ...76.00
Massillon,O. R2 .....76.00
So.Chicago,Ill. R2 ....76.00

SKELP

Aliquippa,Pa. J5 .....3.25
Munhall,Pa. C3 .....3.25
Warren,O. R2 .....3.25
Youngstown C3, R2 ....3.25

WIRE RODS

AlabamaCity,Ala. R2 ..3.40
Cleveland A7 .....3.40
Donora,Pa. A7 .....3.40
Fairfield,Ala. T2 .....3.40
Houston,Tex. S5 .....3.95
Ind.Harbor,Ind. Y1 ....3.40
Johnstown,Pa. B2 .....3.40
Joliet,Ill. A7 .....3.40
LosAngeles B3 .....4.20
Monessen,Pa. P7 .....3.40
Pittsburg,Calif. C11 ....4.05
Portsmouth,O. P12 .....3.40
So.Chicago,Ill. R2 .....3.40
SparrowsPoint B2 .....3.50
Sterling,Ill.(1) N15 ....3.40
Struthers,O. Y1 .....3.40
Torrance,Calif. C11 ....4.20
Worcester,Mass. A7 ....3.70

STRUCTURALS Wide Flange

Bethlehem,Pa. B2 .....3.30
Lackawanna,N.Y. B2 ..3.30
Munhall,Pa. C3 .....3.20
So.Chicago,Ill. C3 .....3.20

H.-S. Low-Alloy

Aliquippa,Pa. J5 .....4.95
Bessemer,Ala. T2 .....4.95
Bethlehem,Pa.(14) B2 ..5.05
Clairton,Pa. C3 .....4.95
Fairfield,Ala. T2 .....4.95
Fontana,Calif. K1 .....6.10
Gary,Ind. C3 .....4.95
Ind.Harbor,Ind. I-2, Y1.4.95
Johnstown,Pa. B2 .....5.05
Lackawna,N.Y.(14) B2 .5.05
Munhall,Pa.(14) C3 ....4.95
So.Chicago,Ill.(14) C3 ..4.95
Struthers,O. Y1 .....4.95

Carbon Steel Stand. Shapes

Aliquippa,Pa. J5 .....3.25
Bessemer,Ala. T2 .....3.25
Bethlehem,Pa. B2 .....3.30
Clairton,Pa. C3 .....3.25
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....3.80
Gary,Ind. C3 .....3.25
Geneva,Utah G1 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2 ....3.25
Johnstown,Pa. B2 .....3.30
KansasCity,Mo. S5 ....3.85
Lackawanna,N.Y. B2 ..3.30
LosAngeles B3 .....3.85
Minnequa,Colo. C10 ....3.75
Munhall,Pa. C3 .....3.25
Niles,Calif.(22) P1 ....3.97
Portland,Oreg. O4 .....3.90
Seattle B3 .....3.90
So.Chicago,Ill. C3, W14 .3.25
So.SanFrancisco B3 ....3.80
Torrance,Calif. C11 ....3.85
Weirton,W.Va. W6 .....3.25

Alloy Stand. Shapes

Clairton,Pa. C3 .....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05

SHEET STEEL PILING

Ind.Harbor,Ind. I-2 ....4.05
Lackawanna,N.Y. B2 ....4.05
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05
Weirton,W.Va. W6 .....4.05

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..3.40
Aliquippa,Pa. J5 .....3.40
Ashland,Ky.(15) A10 ...3.40
Bessemer,Ala. T2 .....3.40
Clairton,Pa. C3 .....3.40
Claymont,Del. W16 ....3.50
Cleveland J5, R2 .....3.40
Coatesville,Pa. L7 .....3.50
Conshohocken,Pa. A3 ...3.50
Ecorse,Mich. G5 .....3.65
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.40
Geneva,Utah G1 .....3.40
Harrisburg,Pa. C5 .....3.75
Houston,Tex. S5 .....3.80
Ind.Harbor,Ind. I-2, Y1.3.40
Johnstown,Pa. B2 .....3.40
Lackawanna,N.Y. B2 ..3.40
Minnequa,Colo. C10 ....4.30
Munhall,Pa. C3 .....3.40
Pittsburgh J5 .....3.40
Seattle B3 .....4.30
Sharon,Pa. S3 .....3.40
So.Chicago,Ill. C3, W14 .3.40
SparrowsPoint,Md. B2 ..3.40
Steubenville,O. W10 ....3.40
Warren,O. R2 .....3.40
Weirton,W.Va. W6 .....3.40
Youngstown C3, Y1 ....3.40

PLATES (Universal Mill)

Fontana,Calif. K1 .....4.30

PLATES, Open-Hearth Alloy

Coatesville,Pa. L7 .....4.50
Conshohocken,Pa. A3 ..4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 .....4.40
Johnstown,Pa. B2 .....4.40
Munhall,Pa. C3 .....4.40
Sharon,Pa. S3 .....4.40
So.Chicago,Ill. C3 .....4.40
SparrowsPoint,Md. B2 ..4.40

PLATES, Ingot Iron

Ashland,cl(15) A10 ....3.65
Ashland,lcl(15) A10 ....4.15
Cleveland,cl R2 .....3.65
Warren,O.,cl R2 .....3.65

PLATES, Wrought Iron

Economy,Pa. B14 .....7.85

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.20
Bessemer,Ala. T2 .....5.20
Clairton,Pa. C3 .....5.20
Cleveland J5, R2 .....5.20
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.45
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 .....5.80
Gary,Ind. C3 .....5.20
Geneva,Utah G1 .....5.20
Houston,Tex. S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 .....5.20
Munhall,Pa. C3 .....5.20
Pittsburgh J5 .....5.20
Sharon,Pa. S3 .....5.65
So.Chicago,Ill. C3 .....5.20
SparrowsPoint,Md. B2 ..5.20
Warren,O. R2 .....5.20
Youngstown Y1 .....5.20

FLOOR PLATES

Cleveland J5 .....4.55
Conshohocken,Pa. A3 ...4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ....4.55
Munhall,Pa. C3 .....4.55
So.Chicago,Ill. C3 .....4.55

BARS, Hot-Rolled Carbon

AlabamaCity,Ala. R2 ...3.35
Aliquippa,Pa. J5 .....3.35
Alton,Ill.(1) L1 .....3.35
Ashland,Ky. (17) A10 ..3.35
Atlanta,Ga. A11 .....3.50
Bessemer,Ala. T2 .....3.35
Buffalo R2 .....3.35
Canton,O. R2 .....3.35
Clairton,Pa. C3 .....3.35
Cleveland R2 .....3.35
Ecorse,Mich. G5 .....3.55
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1.3.35
Johnstown,Pa. B2 .....3.35
KansasCity,Mo. S5 .....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Marion,O. P11 .....3.35
Midland,Pa. C18 .....3.35
Milton,Pa. B6 .....3.35
Minnequa,Colo. C10 ....3.85
Niles,Calif. P1 .....4.05
N.Tonawanda,N.Y. B11 .3.35
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle B3, N14 .....4.10
S.Chicago C3, R2, W14..3.35
So.Duquesne,Pa. C3 ....3.35
S.SanFran.,Cal. B3 ....4.10
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Weirton,W.Va. W6 .....3.35
Youngstown C3, R2 ....3.35

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....3.35
Atlanta,Ga. A11 .....3.50
Bethlehem,Pa.(2) B2 ...3.55
Johnstown,Pa. B2 .....3.35
Lackawanna,N.Y. B2 ..3.35
Niles,Calif. P1 .....4.05
Pittsburgh(23) J5 .....3.35
Portland,Oreg. O4 .....4.10
SanFrancisco S7 .....4.05
Weirton,W.Va. W6 ....3.35

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....3.75
Buffalo R2 .....3.75
Canton,O. R2, T7 .....3.75
Clairton,Pa. C3 .....3.75
Ecorse,Mich. G5 .....4.05
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....3.75
Houston,Tex. S5 .....4.15
Ind.Harbor,Ind. I-2, Y1.3.75
Johnstown,Pa. B2 .....3.75
KansasCity,Mo. S5 .....4.35
Lackawanna,N.Y. B2 ..3.75
LosAngeles B3 .....4.80
Massillon,O. R2 .....3.75
Midland,Pa. C18 .....3.75
S.Chicago C3, R2, W14..3.75
So.Duquesne,Pa. C3 ....3.75
Struthers,O. Y1 .....3.75
Warren,O. C17 .....3.75
Youngstown C3 .....3.75

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. C3 .....4.00
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....4.00
Youngstown C3 .....4.00

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.10
Bessemer,Ala. T2 .....5.10
Bethlehem,Pa. B2 .....5.10
Clairton,Pa. C3 .....5.10
Cleveland R2 .....5.10
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.10
Fontana,Calif. K1 .....6.15
Gary,Ind. C3 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
Pittsburgh J5 .....5.10
So.Duquesne,Pa. C3 ....5.10
Struthers,O. Y1 .....5.10
Youngstown C3 .....5.10

BARS, Cold-Finished Carbon

Aliquippa,Pa. K5 .....4.00
Ambridge,Pa. W18 .....4.00
BeaverFalls, M12, R2..4.00
Buffalo B5 .....4.00
Camden,N.J. P13 .....4.48
Carnegie,Pa. C12 .....4.00
Chicago W18 .....4.00
Cleveland A7, C20 .....4.00
Cumberland,Md. C19 ...3.95
Donora,Pa. A7 .....4.00
Ecorse,Mich. G5 .....4.30
Elyria,O. W8 .....4.00
FranklinPark,Ill. N5 ....4.00
Gary,Ind. R2 .....4.00
Hammond,Ind. L2, M13.4.00
Hartford,Conn. R2 .....4.40
Harvey,Ill. B5 .....4.00
Indianapolis M13 .....4.20
LosAngeles R2 .....5.40
Mansfield,Mass. B5 ....4.40
Massillon,O. R2, R8....4.00
Midland,Pa. C18 .....4.00
Monaca,Pa. S17 .....4.00
Newark,N.J. W18 .....4.40
Plymouth,Mich. P5 .....4.25
Pittsburgh J5 .....3.95
Putnam,Conn. W18 ....4.40
Readville,Mass. C14 ...4.40
St.Louis,Mo. M5 .....4.35
So.Chicago,Ill. W14 ....4.00
SpringCity,Pa.(5) K3 ..4.48
Struthers,O. Y1 .....4.00
Waukegan,Ill. A7 .....4.00
Youngstown F3, Y1.....4.00

BARS, Cold-Finished Alloy

Aliquippa,Pa. K5 .....4.65
Ambridge,Pa. W18 .....4.65
BeaverFalls,Pa. M12 ...4.65
Bethlehem,Pa. B2 .....4.65
Buffalo B5 .....4.65
Canton,O. R2, T7.....4.65
Carnegie,Pa. C12 .....4.65
Chicago W18 .....4.65
Cleveland A7, C20 .....4.65
Donora,Pa. A7 .....4.65
Elyria,O. W8 .....4.65
Gary,Ind. R2 .....4.65
Hammond,Ind. L2, M13.4.65
Hartford,Conn. R2 .....4.95
Harvey,Ill. B5 .....4.65
Indianapolis M13 .....4.85
Lackawanna,N.Y. B2 ..4.65
Mansfield, Mass. B5...4.95
Massillon,O. R2, R8....4.65
Midland,Pa. C18 .....4.65
Monaca,Pa. S17 .....4.65
Newark,N.J. W18 .....4.95
So.Chicago,Ill. R2, W14.4.65
Struthers,O. Y1 .....4.65
Waukegan,Ill. A7 .....4.65
Worcester,Mass. A7 ....4.95
Youngstown F3, Y1.....4.65

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ..3.35
Alton,Ill.(6) L1 .....3.35
Atlanta,Ga. A11 .....3.50
Buffalo R2 .....3.35
Cleveland R2 .....3.35
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1 .3.35
Johnstown,Pa. B2 .....3.35
KansasCity, Mo. S5.....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Minnequa,Colo. C10 ....4.25
Niles,Calif. P1 .....4.05
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle, Wash. B3, N14..4.10
So.Chicago,Ill. R2 .....3.35
So.Duquesne,Pa. C3 ....3.35
So.SanFrancisco B3 ....4.10
SparrowsPoint,Md. B2..3.35
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Youngstown C3, R2 ....3.35

BARS, Reinforcing (Fabricated; to Consumers)

Huntington,W.Va. W7 ..4.50
Johnstown,¼-1" B2 ....4.25
LosAngeles B3 .....5.00
Marion,O. P11 .....4.25
Pittsburgh J5 .....4.25
Seattle B3, N14 .....5.00
So.SanFrancisco B3 ....5.00
SparrowsPt.,1⅛-1¼" B2..4.83
SparrowsPt.,¼-1" B2" ..4.25

RAIL STEEL BARS

ChicagoHts.,Ill.(3) I-2 ..3.25
FortWorth,Tex.(4) T4 ..4.33
Hntngtn,W.Va.(3,4) W7..3.35
Moline,Ill.(3) R2 .....3.35
Williamsport(2,3) S19 ...3.35
Williamsport(4) S19 ...3.85

BARS, Wrought Iron

Economy,Pa.(S.R.)B14..9.50
Economy,Pa.(D.R.)B14.11.00
Economy(Stabit) B14 ..11.30
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5 ...11.25
McK.Rks.(Staybolt) L5..12.75

BARS, Hot-Rolled Ingot Iron

Ashland,Ky.(17) A10 ...3.60

SHEETS, Hot-Rolled Steel (18 gage and heavier)

AlabamaCity,Ala. R2 ..3.25
Ashland,Ky.(8) A10 ...3.25
Butler,Pa. A10 .....3.25
Cleveland J5, R2 .....3.25
Conshohocken,Pa. A3 ..3.35
Ecorse,Mich.(8) G5 ....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.15
Gary,Ind. C3 .....3.25
Ind.Harbor,Ind. I-2, Y1..3.25
Irvin,Pa. C3 .....3.25
Kokomo,Ind. C16 .....3.35
Lackawanna,N.Y. B2 ..3.25
Munhall,Pa. C3 .....3.25
Niles,O. M4 .....3.25
Pittsburg,Calif. C11 ....3.95
Pittsburgh J5 .....3.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
SparrowsPoint,Md. B2 ..3.25
Steubenville,O. W10 ....3.25
Torrance,Calif. C11 ....3.95
Warren,O. R2 .....3.25
Weirton,W.Va. W6 .....3.25
Youngstown C3, Y1 ....3.25

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)

AlabamaCity,Ala. R2 ...4.40
Dover,O. R1 .....5.00
Fairfield,Ala. T2 .....4.15
Ind.Harbor,Ind. I-2 ....4.15
Kokomo,Ind. C16 .....4.25
Mansfield,O. E6 .....4.15
Niles,O. N12, M4 .....4.15
Torrance,Calif. C11 ....5.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.00
Cleveland J5 R2 .....4.00
Ecorse,Mich. G5 .....4.20
Fairfield,Ala. T2 .....4.00
Follansbee,W.Va. F4 ...4.00
Fontana,Calif. K1 .....4.90
Gary,Ind. C3 .....4.00
GraniteCity,Ill. G4 .....4.20
Ind.Harbor,Ind. I-2, Y1.4.00
Irvin,Pa. C3 .....4.00
Lackawanna,N.Y. B2 ..4.00
Middletown,O. A10 ....4.00
Niles,O. M4 .....4.00
Pittsburg,Calif. C11 ...4.95
Pittsburgh J5 .....4.00
SparrowsPoint,Md. B2 ..4.00
Steubenville,O. W10 ....4.00
Warren,O. R2 .....4.00
Weirton,W.Va. W6 .....4.00
Youngstown Y1 .....4.00

SHEETS, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5, R2 .....6.05
Ecorse,Mich. G5 .....6.25
Fontana,Calif. K1 .....6.95
Gary,Ind. C3 .....6.05
Ind.Harbor,Ind. I-2, Y1.6.05
Irvin,Pa. C3 .....6.05
Lackawanna,N.Y. B2 ..6.05
Pittsburgh J5 .....6.05
Sharon,Pa. S3 .....6.05
SparrowsPoint,Md. B2 ..6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Youngstown Y1 .....6.05

UNIVERSITY OF MICHIGAN LIBRARIES

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Calif. K1	6.64
Gary,Ind. C3	4.95
Ind.Harbor,Ind. I-2, Y1	4.95
Irvin,Pa. C3	4.95
Lackawanna,N.Y. B2	4.95
Pittsburgh J5	4.95
Sharon,Pa. S3	4.95
So.Chicago,Ill. C3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.40
Dover,O. R1	5.40
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.40
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance, Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	4.95

SHEETS, Zincgrip No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2	5.15
Niles,O. R2	5.15
Weirton,W.Va. W6	5.00

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Culvert, No. 16 Flat

	Cu Alloy	Cu FE
Ashland A10	5.00	...
Canton,O. R2	5.05	5.50
Fairfield,Ala. T-2	5.00	5.35
Gary C3	5.00	5.35
GraniteCity G4	5.40	5.70
Irvin C3	5.00	5.35
Kokomo C16	5.40	...
MartinsFy,O. W10	5.00	5.35
Pittsburg,Cal. C11	5.75	...
SparrowsPt. B2	5.00	...
Torrance,Cal. C11	5.75	...

SHEETS, Culvert, No. 16 Flat Ingot Iron

Ashland,Ky. A10	5.25

SHEETS, Well Casing

Torrance,Calif. C11	4.75
Youngstown C3	3.75

SHEETS, Aluminized

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (No. 10; Commercial Quality)

BeechBotm.,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Weirton,W.Va. W6	4.80

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.75
Gary,Ind. C3	6.65
Ind.Harbor,Ind. I-2	6.65
Irvin,Pa. C3	6.65
Weirton,W.Va. W6	6.65
Yorkville,O. W10	6.65

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Gary,Ind. C3	8.95
Yorkville,O. W10	8.95

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.50
Cleveland R2	3.85
Ind.Harbor,Ind. I-2	3.50
Warren,O. R2	3.85

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.60
Middletown,O. A10	4.50
Warren,O. R2	4.60

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.95

SHEETS, Zincgrip No. 10 Flat, Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron, No. 12

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.40
Youngstown Y1	4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.75
Fairfield,Ala. T2	5.85
Gary,Ind. C3	5.75
GraniteCity,Ill. G4	5.95
Ind.Harbor,Ind. I-2, Y1	5.75
Irvin,Pa. C3	5.75
Niles,O. R2	5.75
Pittsburg,Calif. C11	6.50
SparrowsPoint,Md. B2	5.85
Warren,O. R2	5.75
Weirton,W.Va. W6	5.75
Yorkville,O. W10	5.75

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.50	$7.75
Fairfield,Ala. T2	7.60	7.85
Gary C3	7.50	7.75
Gran.City,Ill G4	7.70	7.95
Ind.Harb. I-2, Y1	7.50	7.75
Irvin,Pa. C3	7.50	7.75
Pitts.,Cal. C11	8.25	8.50
Sp.Pt.,Md. B2	7.60	7.85
Warren R2	7.50	7.75
Weirton W6	7.50	7.75
Yorkville,O. W10.	7.50	7.75

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.60

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Cleveland J5	3.25
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa, Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.30
Pittsburg,Calif. C11	4.00
Pittsburgh J5	3.25
Riverdale,Ill. A1	3.25
SanFrancisco S7	4.00
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50
Pawtucket,R.I.(12) N8	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Carbon

Berea,O. C7	6.10
Bridgeprt,Conn.(10) S15	4.00
Butler,Pa. A10	4.00
Chicago,Ill. T6	4.15
Cleveland A7, J5	4.00
Detroit, D2, D3	4.25
Detroit M1	4.20
Dover,O. G6	4.00
Ecorse,Mich. G5	4.20
Follansbee,W.Va. F4	4.00
Fontana,Calif. K1	4.90
Ind.Harbor,Ind. I-2	4.00
Lackawanna,N.Y. B2	4.00
LosAngeles C1	5.00
Mattapan,Mass.(21) T6	4.50
Middletown,O. A10	4.00
NewBritain(10) S15	4.00
NewCastle,Pa. B4, E5	4.00
NewHaven,Conn. A7, D2	4.50
NewKensington,Pa. A6	4.00
NewYork W3	5.00
Pawtucket,R.I.(11) N8	4.55
Pawtucket,R.I.(21) N8	4.50
Pawtucket,R.I. R3	4.50
Pittsburgh J5	4.00
Riverdale,Ill. A1	4.15
Sharon,Pa. S3	4.00
SparrowsPoint,Md. B2	4.00
Trenton,N.J.(13) R5	5.00
Wallingford,Conn. W2	4.50
Warren,O. R2, T5	4.00
Weirton,W.Va. W6	4.00
Youngstown C8, Y1	4.00

STRIP, Cold-Rolled, High-strength Low-Alloy

Cleveland A7, J5	6.05
Dover,O. G6	6.05
Ecorse,Mich. G5	6.25
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.05
Pittsburgh J5	6.05
Sharon,Pa. S3	6.05
SparrowsPoint,Md. B2	6.05
Warren,O. R2	6.05
Weirton,W.Va. W6	6.05
Youngstown Y1	6.05

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.00
Youngstown C8	4.00

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40c	0.40-0.60c	0.60-0.80c	0.80-1.05c	1.05-1.35c
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.50	6.10	8.05	10.35
Chicago T6	4.25	5.65	6.25	8.20	10.50
Cleveland A7	4.00	5.50	6.10	8.05	10.35
Dover,O. G6	4.00	5.50	6.10	7.85	10.15
Harrison,N.J. C18	...	...	6.40	8.35	10.65
Mattapan,Mass. T6	4.50	5.80	6.40	8.35	10.65
NewBritn.,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
NewCastle,Pa. B4	4.00	5.50	6.10	...	....
NewYork W3	...	5.80	6.40	8.35	10.65
Pawtucket,R.I. N8	....				
Cleve.orPitts.Base	4.55	5.50	6.10	8.05	10.35
Worcester,Mass.Base	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.00	5.50	6.10	8.05	10.35
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Union,N.J. H6	4.40	6.35	6.35	8.30	10.50
Wallingford,Conn. W2	4.50	5.80	6.40	8.05	10.35
Weirton,W.Va. W6	4.00	5.50	6.10	8.05	10.35
Worcester,Mass. A7	4.30	5.80	6.40	8.35	10.65
Worcester,Mass. T6	4.50	5.80	6.40	8.35	10.65
Youngstown C8	4.50	5.50	6.10	8.05	10.35

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.45	$6.70	$7.00
Fairfield,Ala. T2	6.55	6.80	7.10
Gary,Ind. C3	6.45	6.70	7.00
GraniteCity,Ill. G4	6.65	6.90	7.20
Ind.Harbor,Ind. I-2, Y1	6.45	6.70	7.00
Irvin,Pa. C3	6.45	6.70	7.00
Niles,O. R2	6.45	6.70	7.00
Pittsburg,Calif. C11	7.20	7.45	7.75
SparrowsPoint,Md. B2	6.55	6.80	7.10
Weirton,W.Va. W6	6.45	6.70	7.00
Yorkville,O. W10	6.45	6.70	7.00

SHEET SILICON (24 Gage Base)

	Field	Arm.	Elec.	Motor	Dyn.
BeechBottom,W.Va. W10	...	...	5.45	5.95	6.70	7.50
Brackenridge,Pa. A4	...	...	...	5.95	6.70	7.50
Follansbee,W.Va. F4	...	...	5.45	5.95	6.70	7.50
GraniteCity,Ill. G4	...	...	...	6.15	6.90	7.70
Ind.Harbor,Ind. I-2	...	5.15	5.45	5.95	...	...
Mansfield,O. E6	...	5.15	5.45	5.95	6.70	...
Niles,O. M4	...	5.15	5.45	5.95	...	...
Niles,O. N12	...	...	5.45	5.95	...	...
Toronto,O. F4	...	...	5.45	5.95	6.70	7.50
Vandergrift,Pa. C3	...	...	5.45	5.95	6.70	7.50
Warren,O, R2	...	...	5.45	5.95	6.70	...
Zanesville,O. A10	...	...	5.45	5.95	6.70	7.50

COILS AND CUT LENGTHS, Cold-Rolled, Silicon

	Field	Arm.	Elec.	Motor	Dyn.
Vandergrift,Pa. C3	...	...	5.70	6.20	6.95	7.75
Warren,O. R2	...	5.40	5.70	6.20	6.95	7.75

SHEETS, Silicon Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10	8.05	8.60	9.30	10.10
Brackenridge,Pa. A4	8.05	8.60	9.30	....
Follansbee,W.Va. F4	8.05	8.60	9.30	10.10
Toronto,O. F4	8.05	8.60	9.30	10.10
Vandergrift,Pa. C3	8.05	8.60	9.30	10.10
Zanesville,O. A10	8.05	8.60	9.30	10.10

COLD-REDUCED COILS and Cut Lengths, Silicon

	72	T-100	T-90	T-80
Butler,Pa. A10	...	12.35	13.60	14.85
Vandergrift,Pa. C3	8.30	11.35	12.60	13.85
Warren,O. R2	8.30	....	....	....

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Col. Steel & Shafting Co.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Co.
D4 Disston & Sons,Henry
D6 Driver Harris Co.

E1 Eastrn.Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliot Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.
H6 Hind Steel Co.Inc.

I-1 Igoe Bros.Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel

STRIP Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Cleveland J5	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Pittsburgh J5	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, Cold-Rolled Flat

Chicago T6	5.35
Cleveland A7	5.00
Dover,O. G6	5.00
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.00
Massillon,O. R8	5.00
Monessen,Pa. P7	5.00
Pawtucket,R.I.(11) NS	5.55
Pawtucket,R.I.(12) NS	5.50
Trenton,N.J. R5	5.80
Worcester,Mass. A7	5.30
Worcester,Mass. T6	5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(19) K4	7.70
Chicago W13	7.70
Cleveland A7	7.70
Fostoria,O. S1	7.70
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	7.70
Portsmouth,O. P12	7.70
Struthers,O. Y1	7.70
Trenton,N.J. R5	8.50
Waukegan,Ill. A7	7.70
Worcester, Mass. A7, T6	8.00

WIRE (16 gage)	An'ld. Stone	Galv. Stone
Aliquippa J5	9.05	10.55
Bartnvill(19) K4	9.05	10.55
Cleveland A7	9.05	10.55
Fostoria,O. S1	9.15	10.65
Jonnstown B2	9.05	10.55
Kokomo C16	9.05	10.10
Minnequa C10	9.40	10.90
Pitts.,Cal. C11	9.40	10.90
Prtsmth.(18) P12	9.05	10.55
SparrowsPt. B2	9.15	10.65
Struthers Y1	9.05	10.55
Waukegan A7	9.05	10.55

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.15
Aliquippa,Pa. J5	4.15
Alton,Ill.(1) L1	4.15
Bartonville,Ill.(1) K4	4.15
Buffalo W12	4.15
Chicago W13	4.15
Cleveland A7, C20	4.15
Crawfrdsvll,Ind. M8	4.30
Donora,Pa. A7	4.15
Duluth A7	4.15
Fairfield,Ala. T2	4.15
Fostoria,O.(24) S1	4.50
Houston S5	4.55
Johnstown,Pa. B2	4.15
Joliet,Ill. A7	4.15
KansasCity,Mo. S5	4.75
Kokomo,Ind. C16	4.25
LosAngeles B3	5.10
Minnequa,Colo. C10	4.50
Monessen,Pa. P7	4.15
Newark,6-8ga. I-1	4.75
No.Tonawanda B11	4.18
Palmer,Mass. W12	4.45
Pittsburg,Calif. C11	5.10
Portsmouth,O. P12	4.15
Rankin,Pa. A7	4.15
So.Chicago,Ill. R2	4.15
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.25
Sterling,Ill.(1) N15	4.15
Struthers,O. Y1	4.15
Torrance,Calif. C11	5.10
Waukegan,Ill. A7	4.15
Worcester,Mass. A7, T6	4.45

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Bartonville,Ill.(19) K4	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Milbury,Mass.(12) N6	5.85
Monessen,Pa. P7	5.55
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Trenton,N.J. A7	5.85
Trenton,N.J. R5	6.35
Waukegan,Ill. A7	5.55
Worcester A7,J4,T6,W12	5.85

ROPE WIRE	Plow	Plow	Plow
Bartonville,Ill. K4	7.10	7.40	7.80
Cleveland A7	7.50	7.80	8.20
Donora,Pa. A7	7.50	7.80	8.20
Fostoria,O. S1	8.00	8.30	8.70
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	7.50	7.80	8.20
NewHaven,Conn. A7	7.80	8.10	8.50
Portsmouth,O. P12	7.50	7.80	8.20
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	7.50	7.80	8.20
Trenton,N.J. A7	7.80	8.10	8.50
Trenton,N.J. R5	8.00	8.30	8.70
Waukegan,Ill. A7	7.50	7.80	8.20
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester,Mass. J4	7.50	7.80	8.20

WIRE, Merchant Quality

(6 to 8 gage)	An'ld.	Galv.
Ala.,City, R2	4.80	5.25
Aliquippa J5	4.80	5.25
Atlanta A11	4.90	5.35
Bartnville.(19) K4	4.80	5.25
Cleveland A7	4.80	5.25
Crawfrdvll. M8	4.95	5.40
Donora A7	4.80	5.25
Duluth A7	4.80	5.25
Fairfield T2	4.80	5.25
Houston,Tex. S5	5.20	5.65
Johnstown B2	4.80	5.25
Joliet,Ill. A7	4.80	5.25
KansasCity,Mo. S5	5.40	5.85
Kokomo C16	4.90	5.35
LosAngeles B3	5.75	...
Minnequa C10	5.15	5.60
Monessen P7	4.80	5.25
Pitts.,Cal. C11	5.75	6.20
Portsmth.(18) P12	4.80	5.25
Rankin A7	4.80	5.25
So.Chicago R2	4.80	5.25
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	4.90	5.35
Sterling,Ill.(1)N15	4.80	5.25
Struthers,O. Y1	4.80	5.25
Torrance,Cal. C11	5.75	...
Worcester A7	5.10	5.55

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.20
Alton,Ill.(1) L1	5.20
Cleveland A7	5.20
Donora, Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
LosAngeles B3	6.15
NewHaven,Conn. A7	5.50
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Struthers,O. Y1	5.20
Torrance,Calif. C11	6.15
Trenton,N.J. A7	5.50
Waukegan,Ill. A7	5.20
Worcester,Mass. A7	5.50

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	123
Aliquippa,Pa. J5	123
Atlanta A11	125
Bartonville,Ill.(19) K4	123
Crawfordsvile M8	126
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Houston,Tex. S5	131
Johnstown,Pa. B2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	130
Monessen,Pa. P7	123
Pittsburg,Calif. C11	143
Portsmouth,O.(18) P12	123
Rankin,Pa. A7	123
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

FENCE POSTS	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	120
Moline,Ill. R2	116
Williamspt,Pa. S19,.n.t.	$120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga. R2	175
AlabamaCity,Ala. R2	109
Aliquip.,Pa 9-14½ga. J5	109
Atlanta A11	111
Bartonville,Ill.(19) K4	109
Crawfordsvll,Ind. M8	112
Donora,Pa. A7	109
Duluth A7	109
Houston,Tex. S5	117
Fairfield,Ala. T2	109
Johnstown,Pa. B2	109
Johnstn,17ga.,6" B2	183
Johnstn,17ga.,4" B2	186
Joliet,Ill. A7	109
KansasCity,Mo. S5	121
Kokomo,Ind. C16	111
Minnequa,Colo. C10	116
Monessen,Pa. P7	109
Pittsburg,Calif. C11	132
Portsmouth,O.(18) P12	109
Rankin, Pa. A7	109
So.Chicago,Ill. R2	109
Sterling,Ill.(1) N15	109

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	106
Atlanta A11	107
Bartonville,Ill.(19) K4	106
Chicago W13	106
Crawfordsville M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Joliet,Ill. A7	106
Kokomo,Ind. C16	108
Minnequa,Colo. C10	113
Pittsburg,Calif. C11	130
Portsmouth,O.(18) P12	106
So.Chicago,Ill. R2	106
So.SanFran., Calif. C10	130
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106

NAILS & STAPLES, Stock (To Dealers & Mfrs.)

AlabamaCity,Ala. R2	103
Aliquippa,Pa. J5	103
Atlanta A11	105
Bartonville,Ill.(19) K4	103
Cleveland A9	110
Crawfordsvile M8	106
Donora,Pa. A7	103
Duluth A7	103
Fairfield,Ala. T2	103
Houston,Tex. S5	111
Johnstown,Pa. B2	103
Joliet,Ill. A7	103
KansasCity,Mo. S5	115
Kokomo,Ind. C16	105
Minnequa,Colo. C10	110
Monessen,Pa. P7	103
Pittsburg,Calif. C11	122
Portsmouth,O. P12	103
Rankin,Pa. A7	103
So.Chicago,Ill. R2	103
SparrowsPoint,Md. B2	105
Sterling,Ill.(1) N15	103
Torrance,Calif. C11	123
Worcester,Mass. A7	109

NAILS & STAPLES, Stock (To Jobbers)

Chicago,Ill. Y13	103
Minnequa,Colo. C10	107
Portsmouth,O. P12	100

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.20
Bartonville,Ill.(19) K4	5.20
Donora,Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
Joliet,Ill. A7	5.20
Kokomo,Ind. C16	5.30
Minnequa,Colo. C10	5.55
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
Rankin,Pa. A7	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Worcester,Mass. A7	5.50

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.20
Gary,Ind. C3	5.20
Ind.Harbor,Ind. M13	5.20
Johnstown,Pa. B2	5.20
McKeesRocks,Pa. C3	5.20

TIE PLATES

Fairfield,Ala. T2	4.05
Gary,Ind. C3	4.05
Ind.Harbor,Ind. I-2	4.05
Lackawanna,N.Y. B2	4.05
Minnequa,Colo. C10	4.05
Pittsburg,Calif. C11	4.20
Pittsburgh R2	4.05
Seattle B3	4.50
Steelton,Pa. B2	4.05
Torrance,Calif. C11	4.20
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.25
Fairfield,Ala. T2	4.25
Ind.Harbor,Ind. I-2	4.25
Joliet,Ill. C3	4.25
Lackawanna,N.Y. B2	4.25
Minnequa,Colo. C10	4.25
Steelton,Pa. B2	4.25

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
Lebanon,Pa. B2	8.50
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	8.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
Lebanon,Pa. B2	5.35
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.35
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.55
Williamsport,Pa. S19	3.55

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb. Under
Bessemer,Pa. C3	3.20	3.10	3.15	3.55
Ensley,Ala. T2	3.20	3.10	3.15	3.55
Fairfield,Ala. T2	...	...	...	3.55
Gary,Ind. C3	3.20	3.10	3.15	...
Ind.Harbor,Ind. I-2	3.20	3.10	3.15	...
Johnstown,Pa. B2	...	...	...(16)	3.55
Lackawanna B2	3.20	3.10	...	3.55
Minnequa,Colo. C10	3.20	3.10	...	4.25
Steelton,Pa. B2	3.20	3.10	...	...

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	19.00	18W,4Cr,3V	114.50
Extra Carbon	22.00	18W,4Cr,2V,9Co	168.50
Spec. Carbon	26.50	18W,4Cr,2V,6Co	154.00
Oil Hardening	29.00	18.25W,4.25Cr,1V,4.75Co	142.00
Hi.-Carbon-Cr	52.00	20.25W,4.25Cr,1.6V,12.25Co	266.50
Cr Hot Wrk.	29.00	1.5W,4Cr,1V,8.5Mo	65.00
18W,4Cr,1V	90.50	6.4W,4.5Cr,1.9V,5Mo	69.50
18W,4Cr,2V	102.50	6W,4Cr,3V,6Mo	88.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, R2, S8, T7, U4, V2, V3.

Key to Producing Companies

L6 Lone Star Steel Co.
L7 Lukens Steel Co.
M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New Eng.High Carb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal-Cyclops Steel
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Corp.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Co.
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn. Sheet & Tube

(1) Chicago Base. (2) Angles. (3) Merchant. (4) Reinforcing. (5) Philadelphia del. (6) Chicago or Birm. Base. (8) 16 gage and heavier. (9) 6" and narrower. (10) Pittsburgh Base. (11) Cleveland & Pittsburgh Base. (12) Worcester, Mass. Base. (13) 3" & wider; over ½" to under 3" 5.50c. (14) Also wide flange beams. (15) ½" and thinner. (16) 40 lb and under. (17) Flats only. (18) To dealers. (19) Chicago & Pittsburgh Base. (20) Deduct 0.25c for untreated. (21) New Haven, Conn. Base. (22) Del. San Fran. Bay area. (23) Angles 1"x1" to 1¼"x1¼" only. (24) Deduct 0.35c for finer than 15 Ga.

UNIVERSITY OF MICHIGAN LIBRARIES

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.6c	0.24	41.5	39.5	38.5	13.5	11.5	10.5
¼	6.0	0.42	39.5	37.5	36.5	15.5	13.5	12.5
⅜	6.0	0.57	36	34	33	12.5	10.5	9.5
½	8.5	0.85	43	41	42	26.5	24.5	25.5
¾	11.5	1.13	46	44	45	30.5	28.5	29.5
1	17.0	1.68	48.5	46.5	47.5	33.5	31.5	32.5
1¼	23.0	2.28	49	47	48	34	32	33
1½	27.5	2.73	49.5	47.5	48.5	34.5	32.5	33.5
2	37.0	3.68	50	48	49	35	33	34
2½	58.5	5.82	50.5	48.5	49.5	35.5	33.5	34.5
3	76.5	7.62	50.5	48.5	49.5	35.5	33.5	34.5

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅝", F6; Benwood, W. Va. 1½ percentage point lower on ⅛", 2 points lower on ¼", 3 points lower ⅜", W10; Wheatland, Pa., 2 points lower on ⅛ through ⅜", W9. Following make ½ through 3" only: Lorain, O. N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

Columns B & E: Sparrows Point, Md. B2; Wheatland, Pa., ⅛ through ⅜", W9.

Columns C & F: Alton, Ill. (Lorain, O. Base) LI; Indiana Harbor, Ind., ½ through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛ through ⅜", F6; Benwood, W. Va., except 3½ points lower on ¼", 2½ pts lower on ⅜", 3 pts on ½" W10; Wheatland, Pa., except 2 pts lower on ⅛ through ⅜" W9. Following make ½ through 3" only; Lorain N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	38.5	23	38.5	23
2½	58.5	5.82	41.5	26	41.5	26
3	76.5	7.62	41.5	26	41.5	26
3½	92.0	9.20	43.5	28	43.5	28
4	$1.09	10.89	43.5	28	43.5	28
5	1.48	14.81	43.5	28	43.5	28
6	1.92	19.18	43.5	28	43.5	28

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 4 to 24 in., inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	11.50	13.39	13.00	13.00
1¼	13	13.62	15.87	13.21	15.39
1½	13	15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	13	21.37	25.16	20.73	24.40
2½	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78
4½	9	58.99	69.42	....	....
5	9	68.28	80.35	....	....
6	7	104.82	123.33	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(cents per pound)

Stainless-Clad	PLATES Carbon Base 10%	PLATES Carbon Base 20%	SHEETS Carbon Base 10%	SHEETS Carbon Base 20%	SHEETS Copper Base Both Sides Clad
302	....	....	19.75	21.50	75.00
304	22.50	26.50	20.75	22.50	77.00
305	....	....	....	....	79.00
309	27.00	31.00	....	....	....
310	32.50	36.50	....	....	105.00
316	27.00	31.00	26.00	28.00	....
317	30.50	34.50	....	....	....
318	29.50	33.50	....	....	....
321	23.50	27.50	23.00	25.00	90.00
347	25.00	29.00	24.00	26.00	94.00
405	18.75	24.75	....	....	....
410	18.25	24.25	....	....	....
430	18.25	24.25	....	....	....
Nickel-Clad	27.50	34.50	....	....	88.00
Inconel-Clad	36.00	46.00	....	....	115.00
Monel-Clad	29.00	37.00	....	....	83.00

Production points for carbon base products are: Stainless-clad plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville. Production point for copper-base products is Carnegie, Pa. A13.

BOLTS, NUTS

(To consumers)

F.o.b. midwestern plants. Additional discounts on carriage, machine bolts, 5 for c.l; 15 for full containers, except tire and plow bolts.

CARRIAGE, MACHINE BOLTS

(Per cent off list)

½-in., smaller; up to 6 in. long 35
⅝ & ⅝ x 6 in., shorter. 37
⅝-in. & larger x 6 in., shorter 34
All diameters longer than 6-in. 30
Tire bolts 25
Plow bolts 47
Lag bolts, 6 in., shorter 37
Lag bolts, longer than 6 in. 35

NUTS

Semifinished hexagon	A.S. Reg. & Light	Heavy
⅛-in., smaller	.41 off	.....
½-in., smaller	....	38 off
½-in.-1-in.	....39 off	.....
⅛-in.-1-in.	.....	37 off
1⅛-in.-1½-in.	.37 off	35 off
1⅝-in., larger	.34 off	28 off

Additional discount of 15 for full containers.

STOVE BOLTS

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

SQUARE HEAD SET SCREWS

Upset 1-in. & smaller .51 off
¾, ⅞, & 1 x 6-in. & shorter .....35 off
Headless, ¼-in., larger .31 off

HEXAGON CAP SCREWS

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright) ..... 46 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter ..... 40 off

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 6.75c
7/16-in., under .....48 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed. f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	84,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.
Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2
Baltimore, bars, wire and structurals A10
Brackenridge, Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4
Butler, Pa., sheets and strip except Types 309, 501 & 502 A10
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7
Detroit, strip, except Type 309 quoted 51.00c M1
Dunkirk, N.Y., bars, wire A4
Duquesne, Pa., bars C3
Gary, Ind., sheets except Type 416 C3
Harrison, N. J., strip C18
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501 10.50c, Type 502 11.50c R2
McKeesport, Pa., bars; sheets except Type 416, C3
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2
Middletown, O., sheets and strip, except Types 501 and 502 and except 309 strip quoted 51.00c A10
Midland, sheets & strip C18
Munhall, Pa., bars C3
Pittsburgh, sheets C18
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4
So. Chicago, Ind., bars & structurals C3
Syracuse, N. Y., bars, wire & structurals C18
Titusville, Pa., bars U4
Wallingford, Conn., strip W2
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3
Washington, Pa., Types 301 through 347 sheets & strip except 303 & 309; 316 sheets 58.00c strip 60.00c W4
Watervliet, N. Y., structurals & bars A4
Waukegan, bars & wire A7
West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4
Youngstown, strip C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 20.00
Toluol, one deg. .19.00-23.50
Industrial xylol ..20.50-26.50

Per ton bulk, ovens
Sulphate of ammonia .$45.00

Per pound, ovens
Phenol, 40 (carlots, returnable drums) 13.25
Do., less than carlots..14.00
Do., tank cars 12.50

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.
Old range bessemer ...$7.60
Old range nonbessemer. 7.45
Mesabi bessemer 7.35
Mesabi nonbessemer .. 7.20
High phosphorus 7.20

EASTERN LOCAL ORE

Cents, unit, del. E. Pa. Foundry and basic 56.62% concentrates, contract 16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports
Swedish basic, 60 to 68%:
Spot: 17.00
Long-term contract..15.00
Brazil iron ore, 68-69%..18.50

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty pd.. $20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 81.8c-83.8c per long ton unit, c.i.f. U.S. ports; prices on lower grades adjusted to Mn content and impurities.

CHROME ORE

Gross ton f.o.b. cars, new York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.
Indian and African
48% 2.8:1 .....$35.00
48% 3:1 ..... 37.50
48% no ratio.....28.50-29.00
South African Transvaal
44% no ratio....$19.00-20.00
45% no ratio.....19.50-21.00
48% no ratio.....27.00-28.00
50% no ratio.....28.50-29.00
Brazilian
44% 2.5:1 lump.....$32.00
Rhodesian
45% no ratio....$20.00-21.00
48% no ratio.....28.00-29.00
48% 3:1 lump 37.50
Domestic—rail nearest seller
48% 3:1 ..... $39.00

MOLYBDENUM

Sulphide conc., lb, Mo, cont. Mines $0.90

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvil, fur. $13.00-13.50
Connellsvil, fdry. 15.50-16.00
New River, foundry 18.00
Wise county, foundry 15.35
Wise county, furnace 14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens $22.00
Everett, Mass., ovens
New England, del.‡ 22.70
Chicago, ovens 20.00
Chicago, del. .....†21.45
Detroit, del. 23.91
Terre Haute, ovens... 20.20
Milwaukee, ovens 20.75
Indianapolis, ovens ... 19.85
Chicago, del. 23.32
Cincinnati, del. 22.77
Detroit, del. 23.75
Ironton, O., ovens ... 19.40
Cincinnati, del. 21.63
Painesville, O., ovens 20.90
Buffalo, del. 23.02
Cleveland, del. 22.62
Erie, del. 21.04
Birmingham, ovens ... 17.70
Philadelphia, ovens ... 20.45
Swedeland, Pa., ovens 20.40
Portsmouth, O., ovens 19.50
Detroit, ovens 20.65
Detroit, del. *21.70
Buffalo, del. 22.95
Flint, del. 23.00
Pontiac, del. 21.98
Saginaw, del. 23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS				PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§	Standard Structural Shapes	Carbon	Floor
New York (city)	5.60	6.51	7.10	5.82	...	5.77	6.31	8.28	5.53	5.85	7.36
New York(c'try)	5.40	6.31	6.90	5.62	...	5.57	6.11	8.08	5.33	5.65	7.16
Boston (city) ..	5.75	6.75**	7.16	5.80	...	5.72	6.22	8.77	5.62	5.95	7.45
Boston (c'try) .	5.55	6.55**	6.96	5.60	...	5.52	6.02	8.57	5.42	5.75	7.25
Phila. (city)...	5.90	6.49	6.88	5.65	...	5.65	6.21	8.10	5.35	5.60	6.80
Phila. (c'try) ..	5.65	6.24	6.63	5.40	...	5.40	5.96	7.85	5.10	5.35	6.55
Balt. (city)....	5.46	6.36	6.81	5.52	...	5.57	6.05	...	5.51	5.71	7.16
Balt. (c'try)...	5.31	6.21	6.66	5.37	...	5.42	5.91	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	5.83	...	5.88	6.62	...	5.82	6.02	7.47
Buffalo (del.)..	5.00‡	5.90	7.57	5.39	6.42	5.10	5.60	10.13	5.15	5.50	7.06
Buffalo (w'hse)	4.85‡	5.75	7.42	5.24	6.27	4.95	5.40	9.60	5.00	5.35	6.91
Pitts. (w'hse)..	4.85	5.75[4]*	6.80	5.00	6.00	4.90	5.40	9.20††	4.90	5.05	6.55
Detroit (w'hse).	5.32	6.22[4]*	7.35	5.42	6.42-6.73	5.48	5.90	8.44-8.59	5.48	5.67	7.02
Cleveland (del.)	5.00	5.90	6.70	5.15-5.18	6.15	5.15-5.16	5.60	7.84-8.00	5.15-5.16	5.35-5.36	6.80-6.81
Cleve. (w'hse) .	4.85	5.75	6.55	5.00-5.03	6.00	5.00-5.01	5.45	7.84-7.85	5.00-5.01	5.20-5.21	6.65-6.66
Cincin. (w'hse).	5.27‡	5.94**	6.83	5.39	6.10	5.44	5.95	...	5.44	5.64	7.05
Chicago (city) .	5.05	5.95[4]	7.05	5.05	6.35-6.85	5.10	5.60	7.90[8]	5.10	5.30	6.75
Chicago (w'hse)	4.85	5.75[4]	6.85	4.85	6.15-6.65	4.90	5.40	7.70[8]	4.90	5.10	6.55
Milwaukee (city)	5.18	6.08[4]	7.18	5.18	6.48-6.98	5.23	5.78	8.03[8]	5.23	5.43	6.88
Milwau. (c'try).	5.03	5.93[4]	7.03	5.03	6.33-6.83	5.08	5.63	7.88[8]	5.08	5.28	6.73
St. Louis (del.)	5.37	6.27[4]	7.44	5.34	6.64	5.39	6.19[6]	6.64	5.39	5.59	7.04
St. L. (w'hse) .	5.22	6.12[4]	7.29	5.19	6.49	5.24	6.04[6]	6.49	5.24	5.44	6.89
Birm'ham (city)	5.00	5.90	6.55	5.00	...	5.00	6.83	...	5.05	5.25	7.69
Birm'ham(c'try)	4.85	5.75	6.40	4.85	...	4.85	6.68	...	4.90	5.10	7.54
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
L. A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
San Francisco..	6.15[10]	7.50[8]	7.80	6.75[10]	8.25[8]	5.90[10]	7.55	10.85[2]	5.90	6.35	8.10
Seattle-Tacoma.	6.70[7]‡	8.15[3]	8.80	6.70[7]	...	6.20[7]	8.15[3]	10.10	6.00[7]	6.35[7]	8.40[7]

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; ** 17 gage; †† as annealed. Base quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; galvanized sheets, 450 lb to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—1500 to 1999 lb; [9]—400 to 3999 lb; [10]—400 lb and over; [11]—500 to 1499 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $100. Hard-fired, $135 at above points.

High-heat Duty: Salina, Pa. $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., Ottawa, Ill., $66.

LADLE BRICK

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa., Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $90; Beach Creek, Pa., $80.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa., $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45

LEADING FERROALLOY PRODUCTS

Manganese Alloys

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload. 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

(*Please turn to page* 208)

UNIVERSITY OF MICHIGAN LIBRARIES

Zinc and Copper Sales Increase

Prime western prices advance to 9.75c, East St. Louis, as steel mills re-enter market. Copper suppliers allocate tonnages to assure equitable distribution; prices tend upward

New York — Anticipating an early end to the strike, steel mills are buying zinc in substantial quantities. This resulted in a further advance in prime western prices to the basis of 9.75c, East St. Louis. Agreement between the steelworkers' union and Bethlehem Steel Co. (second largest tin plate manufacturer) failed to stimulate activity in the tin market, however. Offerings of grade A tin for prompt delivery at 94.00c are not being fully absorbed, despite the comparatively small tonnages available at that level, 1-cent under RFC's selling prices.

Demand for copper remains heavy, sustaining that market on a strong price basis at 17.62½-18.50c , delivered Connecticut, for electrolytic. Phelps Dodge Corp. raised its price ⅞-cent a pound, effective Nov. 3, to 18.50c. The former price had been in effect since July 11. Other leading producers were expected momentarily to take similar action in view of the heavy demand.

Strength in copper and zinc has not spread to the lead market, although it remains firm at 12.80c, St. Louis. Bookings are in only moderate volume.

Zinc—Price of 9.75c for prime western compares with 9.25c immediately prior to the shutdown of principal galvanizing lines and with 17.50c for most of the first quarter of this year.

In addition to the resumption of buying by the steel companies, the upward swing in prices is attributed also to the loss of over 15,000 tons a month due to strikes at plants in Palmerton and Donora, Pa., and at the Bunker Hill smelter. The shortage of coal is an increasingly serious threat to the maintenance of operations at many of the zinc smelteries and refineries.

Brass mills and die casters are buying substantial tonnages of special high-grade zinc.

Copper—The more promising outlook for early settlement of the steel strike has served to stimulate copper consumers' interest in covering future needs. Threat of strikes at copper producing plants has also stimulated purchases.

Demand has been heavy for several weeks and now has reached the point where suppliers are forced to allocate their tonnages to assure equitable distribution among their customers. Some producers have sold more for November delivery than they will produce and will make up the difference by drawing on reserve stocks that had been accumulated earlier in the year. Sales made in October for current shipment and for future delivery totaled more than 122,000 tons. Sales booked for October shipment indicate deliveries for the month amounted to around 115,000 tons, including carryover from the previous month.

Lead—Lead producers are booking a satisfactory volume of business with sales occasionally exceeding daily intake of ore and scrap. This shows a slight improvement over bookings for October shipment which were about 23,000 tons under those for September. The latter month is usually an active period in the lead market. Battery makers and cable manufacturers are the chief buyers at present. Prices held steady on the basis of 12.80c, St. Louis, for the common grade.

Tin—Bi-lateral negotiations, aiming at the acquisition of tin by the United States government, will be resumed in the near future, according to reports being received here from Brussels. Negotiations are expected to be carried on separately with the British, Belgian and Dutch authorities.

STEEL's Metal Price Averages for Oct., 1949

(Cents per pound)

Electrolytic Copper, Del. Conn.	17.625
Lead, St. Louis	13.242
Prime, Western Zinc, E. St. Louis	9.317
Straits Tin, New York	95.505
Primary Aluminum Ingots, del.	17.000
Antimony, f.o.b. Laredo, Tex.	32.000
Nickel, f.o.b. refinery	40.000
Silver, New York	73.250

In the meantime, sales are being transacted on the open market well below RFC's selling prices which are based on 95.00c for spot delivery of grade A metal. Small lot sales of grade A tin were reported as low as 93.75c, although the market generally was considered 94.00c on representative sales. Grade A tin for November arrival was quoted nominally 93.00c.

Output of refined tin by the Longhorn smelter at Texas City, Tex., amounted to 2964 tons in October compared with 2910 tons in September and 2300 tons in October, 1948, reports the Office of Domestic Commerce. This brought the total for the first 10 months to 30,268 tons compared with 30,617 tons in the like period a year ago and 27,502 tons two years ago.

Since the British Ministry of Supply and RFC have made no change in their selling prices, the Bolivian producers will receive settlement for deliveries made in October at 91.00c, f.a.s. South American ports which is the basis of 95.00c for Grade A tin at New York. Producers in Malaya and Nigeria will reecive tentative settlements from the British Ministry of Supply on the basis of about 75.00c to 76.00c for Grade A at New York on tin concentrates tendered between Sept. 18 and Nov. 15.

General Bronze Buys Brach Mfg.

New York—General Bronze Corp. has acquired the business of L. S. Brach Mfg. Corp., Newark, N. J., and will operate it as a division. A. S. Saphier, president of General Bronze, says the acquired company has been in operation for the past 43 years producing equipment for the automotive, railroad, radio and television industries.

Tin Plate Output Turns Upward

Pittsburgh—About 35 per cent of tin mill facilities will be in operation with resumption of production schedules by Bethlehem Steel; Weirton and Granite City have been operating throughout the strike period. Tin plate producers have relatively little inventory to help relieve customers' depleted stocks when full operations are resumed. It is estimated that capacity tin plate output can not be achieved much under two weeks following termination of strike.

Cuts Power to Aluminum Plants

Portland—Bonneville Power Administration has ordered 70,000 kws cut off the allowance for Alcoa's plant at Vancouver, Wash. and the Spokane plant of Permanente Metals Corp. This action was prompted by continued low flow of the Columbia river and increasing winter power loads on the Bonneville system. The cutback is effective as soon as potlines can be taken out of service. The 70,000 kws is the excess being delivered over contract agreements. Of the total, 42,200 kws apply to Alcoa, 27,800 to Permanente.

Britain Raises Zinc Prices

London — Ministry of Supply advanced its selling prices of zinc to consumers in the United Kingdom £2 per ton, effective Nov. 3, to the basis of £85 10s for Prime Western and other good ordinary brands.

At $2.80 for the pound sterling this is equal to 10.69c a pound, U. S. currency. The new United Kingdom prices, delivered consumer's plant, are as follows:

Good ordinary brand, foreign, (duty paid) £85 10s 0d (10.69c); domestic, £85 10s 0d (10.69c); "prime western", £85 10s 0d (10.69c); refined and electrolytic, £86 5s 0d (10.78c); not under 99.99%, £87 15s Od (10.97c).

Canadian Zinc Prices Rise

Montreal—Consolidated Mining & Smelting Co. of Canada Ltd. advanced zinc prices ½-cent a pound last week. Prices advanced ¼-cent on Oct. 31 and a like amount Nov. 2, making the new price schedule: Prime western, 10.75c; Grade A, 11.50c; special high grade 11.75c. The upward revision followed an advance in the United States market.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 17.62½-18.50c, Conn. Valley, Lake, 17.75c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 17.00-17.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-15.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.00c, East St. Louis; high grade 10.75c, delivered.

Lead: Common 12.80c; chemical 12.90c; corroding 12.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 15.75-16.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.75-18.25c; grade 2, 16.75-17.25c; grade 3, 15.50-16.25c; grade 4, 14.75-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

5% titanium-aluminum alloy No. 1 (low Cu) 31.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A tin, spot, 94.00c, New York; Straits, November arrival, 93.00c, December arrival 92.00c. Chinese, 99% tin, prompt 86.50-87.00c; November arrival, 84.00-85.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 95.00c; Grade B, 99.8% or higher, not meeting specs. for Grade A, with 0.05% max. arsenic, 94.80c; Grade C, 99.65-99.79%, incl., 94.40c; Grade D, 99.5-99.649%, 94.40c; Grade E, 99-99.499%, 94.00c; Grade F, 98-98.999%, 93.50c; Grade G, 95-97.999%, 91.00c. Prices for grade D through Grade G are for tin content.

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 32.50c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99% (Chinese, English, Belgium), prompt, 26.25c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $73-$75 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 16-cent copper.)

Sheet: Copper 31.30; yellow brass 28.19; commercial bronze, 95%, 31.28; 90%, 30.84; red brass, 85%, 29.89; 80%, 29.47; best quality, 29.01; nickel silver, 18%, 41.78; phosphor-bronze, grade A, 5%, 50.47.

Rods: Copper, hot-rolled 27.15; cold-drawn 28.40; yellow brass free cutting, 22.76; commercial bronze, 95% 30.97; 90% 30.53; red brass 85% 29.58; 80% 29.16.

Seamless Tubing: Copper 31.34, yellow brass 31.20; commercial bronze 90% 33.50; red brass 85% 32.80; 80% 32.38.

Wire: Yellow brass 28.48; commercial bronze, 95% 31.57; 90% 31.13; red brass, 85% 30.18; 80% 29.76; best quality brass 29.30.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.42½, l.c.l. 23.05, c.l. 22.55; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.693, l.c.l. 25.443, c.l. 24.943; magnet, delivered, c.l. 27.62½, 15,000 lb or more 27.87½, l.c.l. 28.37½.

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $18.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $18.00 per cwt. Traps and bends: List price plus 48%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Nov. 3	17.625-18.50	12.80	9.75	94.00	17.00	32.00	40.00	73.25
Nov. 1-2	17.625	12.80	9.75	94.00	17.00	32.00	40.00	73.25
Oct. Avg.	17.625	13.242	9.317	95.505	17.00	32.00	40.00	73.25
Oct. 28-31	17.625	12.80	9.50	94.00	17.00	32.00	40.00	73.25
Oct. 27	17.625	12.80	9.50	94.50	17.00	32.00	40.00	73.25
Oct. 24-26	17.625	12.80	9.25	95.00	17.00	32.00	40.00	73.25
Oct. 18-22	17.625	12.80	9.25	95.750	17.00	32.00	40.00	73.25
Oct. 17	17.625	12.80	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 14-15	17.625	12.85	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 10-13	17.625	13.55	9.25	95.875	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del, New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 27.96c; oval 27.46c; cast 25.99c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.25c; over 250 lb, 24.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 111.00c, 500 to 999 lb, 111.50c; 200 to 499 lb. 112.00c; less than 2090 lb, 113.50c; ball, 1000 lb and over, 113.25c; 500 to 999 lb, 113.75c; 200 to 499 lb. 114.25c; less than 200 lb, 115.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 67.9c; 100 or 300 lb drums only, 100 to 500 lb, 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c, f.o.b. Sewaren, N. J. On 100 or 350 lb drums only, 100 to 600 lb 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c; 10,000 lb and over, 54.4c, f.o.b. Carteret, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 96.00c; more than 2000 lb, 94.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 83.00c; 100 lb kegs 84.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	14.62½	14.62½	13.87½
Yellow brass	12.00	11.75	11.00
Commercial Bronze			
95%	13.62½	13.37½	12.87½
90%	13.50	13.25	12.75
Red brass			
85%	13.25	13.00	13.12½
80%	13.00	12.75	12.25
Best Quality (71-80%)	12.87½	12.62½	12.12½
Muntz Metal	11.12½	10.87½	10.37½
Nickel, silver, 10%	14.00	13.75	7.00
Phos. bronze, A	16.37½	16.12½	15.12½
Naval brass	11.62½	11.37½	10.87½
Manganese bronze	11.62½	11.37½	10.75

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.50-14.75; No. 2 copper 13.50-13.75; light copper 12.50-12.75; composition red brass 12.50; radiators 9.50-9.75; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.50; No. 2 copper 13.50; light copper 12.50; refinery brass (60% copper) per dry copper content 12.00; radiators 9.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire No. 1 13.00-13.25; No. 2 12.00-12.25; light copper 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.50-6.75; new brass clippings 10.00-10.50; No. 1 brass rod turnings 8.75-9.00; light brass 6.25-6.50; heavy yellow brass 7.00-7.25; new brass rod ends 9.25-9.50; auto radiators, unsweated 8.50-8.75; cocks and faucets, 9.00-9.25; brass pipe 9.50-9.75.

Lead: Heavy 9.50-9.75, battery plates 5.00-5.25; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.75-10.00.

Zinc: Old zinc 4.00-4.25; new die cast scrap 3.75-4.00; old die cast scrap 2.75.

Tin: No. 1 pewter 48.00-50.00, block tin pipe 70.00-72.00, No. 1 babbitt 36.00-38.00.

Aluminum: Clippings 2S 10.00-10.50, old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

UNIVERSITY OF MICHIGAN LIBRARIES

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Oct. 27, 1949; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Nov. 3	$28.00
Oct. 27	26.67
Oct. 1949	26.71
Nov. 1948	43.25
Nov. 1944	16.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$29.00-30.00*
No. 2 Heavy Melt.	*27.00-28.00*
No. 1 Busheling	*29.00-30.00*
No. 1 Bundles	*29.00-30.00*
No. 2 Bundles	*24.00-25.00*
No. 3 Bundles	*23.00-24.00*
Heavy Turnings	*23.50-24.50*
Machine Shop Turnings	*21.50-22.00†*
Mixed Borings, Turnings	*21.50-22.00†*
Short Shovel Turnings	*23.00-24.00*
Cast Iron Borings	*22.00**
Low Phos. Steel	*31.50-32.50*

Cast Iron Grades*

No. 1 Cupola Cast	35.00-36.00
No. 1 Machinery Cast	39.00-40.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	28.00-29.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	31.00
Axles	35.00-36.00
Rails, Random Length	34.00-35.00
Rails, 2 ft and under	38.00-39.00
Rails, 18 in. and under	39.00-40.00
Railroad Specialties	32.00-33.00
Angles, Splice Bars	32.00-33.00

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	*$26.50†*
No. 2 Heavy Melt. Steel	*25.50†*
No. 1 Busheling	*26.50†*
No. 1 Bundles	*26.50†*
No. 2 Bundles	*23.50†*
Machine Shop Turnings	*18.00†*
Mixed Borings, Turnings	*20.00†*
Short Shovel Turnings	*20.00†*
Cast Iron Borings	*20.00†*
Bar Crops and Plate	*28.50†*
Punchings & Plate Scrap	*28.50†*
Cut Structurals	*31.50†*

† Nominal.

Cast Iron Grades†

No. 1 Cupola	*43.00-44.00*
Charging Box Cast	*36.00-37.00*
Stove Plate	*37.00-38.00*
Heavy Breakable Cast	*34.00-35.00*
Unstripped Motor Blocks	*31.50-32.50*
Brake Shoes	*31.00-32.00*
Clean Auto Cast	*45.00-46.00*
No. 1 Wheels	*37.00-38.00*
Burnt Cast	*32.00-33.00*

† Nominal.

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00
R.R. Malleable	*37.50-38.50*
Rails, 3 ft and under	*41.00-42.00*
Rails, Random Lengths	*37.00-38.00*
Cast Steel	*34.00-35.00*
Railroad Specialties	*34.00-35.00*
Uncut Tires	*34.00-35.00*
Angles, Splice Bars	*40.00-41.00*

VALLEY

No. 1 Heavy Melt. Steel	29.00-29.50
No. 2 Heavy Melt. Steel	28.00-28.50
No. 1 Bundles	29.00-29.50
No. 2 Bundles	25.00-25.50
Machine Shop Turnings	19.00-20.00
Short Shovel Turnings	22.00-23.00
Cast Iron Borings	22.00-23.00
Low Phos.	*31.00-31.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.50-33.50*

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$25.00*
No. 2 Heavy Melt. Steel	*23.00*
No. 1 Busheling	*23.00*
No. 1 Bundles	*25.00*
No. 2 Bundles	*22.00*
Machine Shop Turnings	17.00
Short Shovel Turnings	18.00
Mixed Borings, Turnings	*16.00*
Bar Crop and Plate	26.00-27.00
Punchings & Plate Scrap	26.00-27.00
Cut Structurals	*25.00-26.00*
Elec. Furnace Bundles	*25.00*
Heavy Turnings	*25.00*
No. 1 Chemical Borings	26.00-27.00

Cast Iron Grades

No. 1 Cupola Cast	*35.00*
No. 1 Machinery Cast	*38.00-39.00*
Charging Box Cast	*35.00*
Heavy Breakable Cast	*35.00*
Unstripped Motor Blocks	*30.00*
Clean Auto Cast	*38.00-39.00*
No. 1 Wheels	*38.00*
Malleable	*37.00*

CINCINNATI

No. 1 Heavy Melt. Steel	*$27.00*
No. 2 Heavy Melt. Steel	*24.00*
No. 1 Busheling	*27.00*
No. 1 Bundles	*27.00*
No. 2 Bundles	*22.00*
Machine Shop Turnings	*14.00*
Short Shovel Turnings	*17.00*
Mixed Borings, Turnings	15.00
Cast Iron Borings	*17.00*

Cast Iron Grades

No. 1 Cupola Cast	41.00
Charging Box Cast	31.00
Heavy Breakable Cast	34.00
Stove Plate	30.00
Unstripped Motor Blocks	20.00
Brake Shoes	22.00
Clean Auto Cast	*41.00*
Drop Broken Cast	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*29.00*
R.R. Malleable	33.00
Rails, Rerolling	*38.00*
Rails, Random Lengths	35.00
Rails, 18 in. and under	44.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	*$19.00-20.00*
No. 1 Bundles	*22.00-23.00*
No. 2 Bundles	*18.00-19.00*
No. 1 Busheling	*22.00-23.00*
Machine Shop Turnings	*14.00-15.00*
Mixed Borings, Turnings	*14.00-15.00*
Short Shovel Turnings	*16.00-17.00*
Cast Iron Borings	*16.00-17.00*
Punchings & Plate Scrap	*22.00-23.00*

Cast Iron Grades

No. 1 Cupola Cast	*33.00-34.00*
Heavy Breakable Cast	*29.00-30.00*
Clean Auto Cast	*33.00-34.00*

BUFFALO

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 2 Heavy Melt. Steel	24.50-25.00
No. 1 Bushelings	24.50-25.00
No. 1 Bundles	25.50-26.00
No. 2 Bundles	23.00-23.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	20.50-21.00
Low Phos.	28.50-29.00

Cast Iron Grades

No. 1 Machinery	*37.50-38.00*
No. 1 Cupola	*36.50-37.00*
Mixed Yard	35.50-36.00
Malleable	34.50-35.00

Railroad Scrap

Rails, 3 ft. and under	35.00-36.00
Scrap rails	30.00-31.00
Specialties	31.00-32.00
No. 1 car wheels	32.00-33.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$20.00*
No. 2 Heavy Melt. Steel	*18.00*
No. 1 Busheling	*16.00*
No. 1 Bundles	*20.00*
No. 2 Bundles	*16.00*
No. 3 Bundles	nominal
Machine Shop Turnings	10.00-11.00
Mixed Borings, Turnings	10.00-11.00
Short Shovel Turnings	11.00-12.00
Punchings & Plate Scrap	22.00-23.00
Cut Structurals	22.00-23.00
Elec. Furnace Bundles	*20.00-21.00*

Cast Iron Grades

No. 1 Cupola Cast	29.00-30.00
No. 1 Machinery	31.00-32.00
Charging Box Cast	25.00-26.00
Heavy Breakable	25.00-26.00
Unstripped Motor Blocks	26.00
Malleable	*35.00*

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$18.00-19.00*
No. 2 Heavy Melt. Steel	*16.50-17.00*
No. 1 Bundles	*18.00-19.00*
No. 1 Busheling	*14.50-15.00*
Machine Shop Turnings	*10.50-11.50*
Mixed Borings, Turnings	*10.00-10.50*
Short Shovel Turnings	*12.00-13.00*
Bar Crops and Plate	*20.00-21.00*
Punchings & Plate Scrap	*20.00-21.00*
Chemical Borings	*17.00-19.00*

Cast Iron Grade

No. 1 Cupola Cast	30.00-31.00
Mixed Cast	27.00-28.00
Heavy Breakable Cast	28.00-29.00
Stove Plate	*24.00-25.00*
Unstripped Motor Blocks	20.00-21.00

CHICAGO

No. 1 Heavy Melt. Steel	*$29.00-30.00**
No. 2 Heavy Melt. Steel	*28.00-29.00**
No. 1 Bundles	*29.00-30.00**
No. 2 Bundles	*26.00-27.00**
No. 3 Bundles	*18.00-19.00**
Machine Shop Turnings	*21.00-22.00*
Mixed Borings, Turnings	*21.00-22.00*
Short Shovel Turnings	*22.00-23.00**
Cast Iron Borings	*20.00-21.00**
Bar Crops and Plate	29.00-31.00
Punchings	29.00-31.00
Elec. Furnace Bundles	*29.00-30.00**
Heavy Turnings	*24.00-25.00**
Cut Structurals	*30.00-31.00**

Cast Iron Grades

No. 1 Cupola Cast	41.00-42.00
Clean Auto Cast	41.00-42.00
No. 1 Wheels	33.00-34.00
Stove Plate	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*33.00-34.00*
Malleable	37.00-38.00
Rails, Rerolling	*44.00-45.00*
Rails, Random Lengths	*42.00-44.00**
Rails, 2 ft. and under	*42.00-43.00**
Rails, 18 in. and under	*43.00-44.00**
Railroad Specialties	*35.00-36.00**
Angles, Splice Bars	*36.00-37.00**

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	*$30.00-31.00*
No. 2 Heavy Melt. Steel	25.00-26.00
Machine Shop Turnings	*19.00-20.00*
Short Shovel Turnings	21.00-22.00

Cast Iron Grades

No. 1 Cupola Cast	*37.00-38.00*
Charging Box Cast	34.00-35.00
Heavy Breakable Cast	32.00-33.00
Brake Shoes	32.00-33.00
Clean Auto Cast	40.00-42.00
Burnt Cast	32.00-33.00

Railroad Scrap

R.R. Malleable	31.00-32.00
Rails, Rerolling	39.00-40.00
Rails, Random Lengths	*35.00-36.00*
Rails, 3 ft. and under	*37.00-39.00*
Uncut Tires	*29.00-30.00*
Angles, Splice Bars	*37.00-38.00*
Railroad Specialties	*30.00-31.00*

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	37.00
Rails 3 ft. and under	25.00-26.00
Angles and Splice Bars	31.00-33.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$17.00
No. 2 Heavy Melt. Steel	15.00
Nos. 1 & 2 Bundles	13.00

Cast Iron Grades

No. 1 Cupola Cast	23.00-25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	17.00
Wheels	17.00
Rails, Random Lengths	17.00

SEATTLE

No. 1 Heavy Melt. Steel	$16.00
No. 2 Heavy Melt. Steel	16.00
No. 1 Busheling	13.50
Nos. 1 & 2 Bundles	14.00
No. 3 Bundles	nom.
Machine Shop Turnings	11.00
Mixed Borings, Turnings	11.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles	23.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-27.50
Heavy Breakable Cast	17.00
Stove Plate	17.00
Unstripped Motor Blocks	17.00
Malleable	20.00
Brake Shoes	17.00-18.00
Clean Auto Cast	23.00
No. 1 Wheels	22.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	17.00
Railroad Malleable	22.00
Rails, Random Lengths	17.00
Angles and Splice Bars	17.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.00
Punchings & Plate Scrap	24.00
Electric Furnace Bundles	26.00

Cast Iron Grades

No. 1 Cupola Cast	$30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	25.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades*

Cast	40.00-43.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

Sheets Strip . . .

Sheet and Strip Prices, Page 185 & 186 & 187

Cleveland—Even if flat-rolled steel production is back to pre-strike levels by end of November, mills will be unable to deliver all tonnage booked until well into first quarter of next year. Accumulations are heaviest in months and the carryover into first quarter will be substantial, especially in the more popular gages. Some of the tonnage now held may wash out when the strike ends and the outlook becomes clearer, but this is not likely to materially lessen the threat of tight supplies. Pinch of short and unbalanced inventories is reflected in an increasing number of manufacturing curtailments. Some shops that have been forced to curtail or close will not be able to fully replenish inventories until well into next quarter. Anticipating return of tight supply conditions, with gray market operations again figuring prominently, the Pressed Metal Institute has revived its trading exchange, enabling members to obtain fill-in tonnage from among themselves. Offers of surplus stocks are beginning to appear in the market in increasing number.

Boston—Mills' order backlogs for sheets, notably cold-rolled, have increased. Once the log jam of unscheduled tonnage is cleared, books will be filled through first quarter and beyond. Considerable buying is of protective nature, but few cancellations or deferments are expected. Consumers' cold-rolled strip supply is not so critical because a substantial ratio of tonnage normally produced in this area was not halted. Cold-rolled strip mills have been forced to adjust rollings to inventories of hot-rolled.

New York—With many mills still down, the delivery situation on sheets continues uncertain. Most mills are accepting orders for hot-rolled sheets on the basis of 12 to 15 weeks from the time of resumption of operations. Still longer promises are being made on cold-rolled and galvanized.

Philadelphia—Strong demand for sheets is expected. Even before the steel strike most consumer stocks were not sufficient for current needs, a situation that has been further complicated by the shutdown of many mills. As mill operations resume, there should be increasing pressure for all major grades. Some mills are booking tonnage tentatively well into the second quarter, although one producer who has been able to keep most of his units going has not opened books for the next period. Hence, this producer is out of the market on all grades except stainless and certain specialties.

Pittsburgh — Effort to conserve sheet and strip inventories has resulted in curtailment among a growing number of metalworking companies. Some interests state hold-up of delivery instructions on finished products is an additional factor necessitating lower schedules. Most metalworking concerns estimate it will be 3 to 4 weeks after steel suppliers resume operations before orders on mill books will be shipped. Unbalanced stock of important components is major threat to produc-

SLASH MELTING COSTS

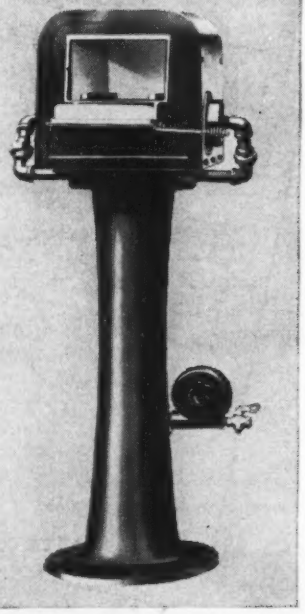
JOHNSON
No. 1019
SOFT METAL FURNACE

$312.00
F. O. B. FACTORY

for heavy-duty melting • Save time and gas in melting large quantities of lead, tin, zinc, pot metal, type metal, aluminum, etc. Nine powerful Johnson direct jet burners deliver pot temperatures up to 1400° F. for fast melting. Assures quick recovery after reloading. Each burner has separate shut-off valve and pilot light permitting use of only as many burners as needed to maintain melting temperature. Heavily insulated to reduce heat loss. Complete with removable cast iron pot and lifting hooks.

SPECIFICATIONS
Height—30". Diameter—30".
Capacity—1000 lbs. lead.
Pot—19" diam. x 10" deep.
B.T.U. Input—234,000 per hour.
Shipping Weight—600 lbs.

Quick Acting
JOHNSON No. 120
HEAT TREATING FURNACE



• 1500° F. in 5 minutes
• 2300° F. in 30 minutes

Quick Acting JOHNSON No. 120 is unexcelled for heat treating high speed steels, for hardening any steel tools, dies, or small metal parts. Ideal for brazing carbide tipped tools. Gets the job done quick to save time and gas. Easily regulated with accuracy. Firebox 5 x 7¾ x 13½ lined with high temperature insulating refractory. Complete with Carbofrax Hearth, G. E. Motor, and Johnson Blower.

$145.50
F. O. B. FACTORY

JOHNSON GAS APPLIANCE CO.
573 E Avenue N. W., Cedar Rapids, Iowa

COMPLETE JOHNSON CATALOG . . . Write for FREE Catalog describing all time saving, cost cutting JOHNSON Furnaces for pot hardening, melting, annealing and heat treating purposes

UNIVERSITY OF MICHIGAN LIBRARIES

tion schedules. A cutback in production by Westinghouse is expected soon if strike is not terminated.

Anticipated shortage of plain and galvanized sheets through first quarter next year has prompted three of the former company members of the Phoenix-Apollo Co. to resume output of these items under the name of Whitney-Apollo Corp., Apollo, Pa.

Cincinnati—Ordering of sheets for first quarter is similar in tonnage and specifications to those earlier in the year. This indicates fabricators are depending on usual sources for first quarter tonnage and that they expect backed-up requirements to offset whatever decline in general business may have been generated by strikes. Pressure for current deliveries is extremely heavy. Strikes and the government bin program put a double squeeze on galvanized.

Chicago—Curtailments in certain sheet-fabricating departments are more commonplace. Complete closings are rare. Wherever possible, trades between plants and companies are negotiated and substitute materials used. New orders for cold-rolled and galvanized sheets probably can not be delivered before second quarter. Best strip promises are for about February shipment. New conversion agreements are concentrated in cold-rolled sheets but also spill over into other products. Most such deals involve auto makers.

Milwaukee—Big users of galvanized sheets probably are suffering the greatest loss from the strike. A number of users of other types of sheets have shortened the work-week one day or have furloughed about 20 per cent of the work force. Time table of curtailment at one important plant here reduces operations to less than 50 per cent at the end of this month, and to 10 per cent in December. Lag in steel shipments after the strike will force at least partial adherence to this schedule.

St. Louis—Sheet demand here holds at a high level, with October showing twice the normal number of new orders booked. First-quarter books are filled and second quarter orders are being refused. In recent weeks Granite City Steel Co. has been flooded with calls from strike-bound steel centers. Its cold reduction mill is operating at capacity. Its tin mill will be shut down 90 days starting Jan. 15 for improvements which will end its production of hot-dipped tinplate and raise electrolytic output 50 per cent.

Los Angeles—Sheet consumers are relieved over the first signs of a break in the steel deadlock. With beginning of November, supplies became a matter of weeks or days for most fabricators. One user had a complete shutdown scheduled for mid-month. On resuming operations, producers will be allocating flat-rolled items. Mills probably will not accept new orders for sheet for some time.

San Francisco—Sheet supplies in the hands of consumers vary widely. Jobbers' stocks of flat-rolled products are dwindling slowly. Indications are that sheet supplies by mid-November will be very tight.

Tubular Goods . . .

Tubular Goods Prices, Page 188

Boston—Allocation of merchant steel pipe to distributors likely will continue well into first quarter by some producers. Distributors' stocks are depleted and unbalanced with orders for replacement substantial. Lack of pipe has delayed some outside work scheduled for completion before freezing. Utilities are estimating lateral line tonnage requirements for natural gas distribution in New England. Cast pipe orders are heavy for this season, an additional 4100 tons having been placed.

Pittsburgh—Replenishment of jobbers' stocks of standard pipe items should sustain mill production schedules at near capacity for at least 3 months following end of the strike. A similar situation is expected for oil country goods and to lesser extent for specialty tubing items. Some pipeline expansion programs have been postponed because of the strike.

Chicago—Shortages in many sizes of tube rounds have caused a district producer to close its hot mill. Assuming semi-finished will be freely available in a week to 10 days, this interest may not have to curtail finishing operations. The first part of October saw ordering moderately improved, but bookings slid off the latter part of the month.

Los Angeles—Pipe demand remains strong, although the petroleum industry is placing more emphasis on new facilities for sales and distribution, less on exploitation or refining.

PETER A. FRASSE AND CO., INC.
Armstrong-Blum Mfg. Co.
5700 Bloomingdale Avenue
Chicago 39, Illinois
Gentlemen:
We are very satisfied with the performance of the new 6A and 9A Marvel Heavy-Duty Automatic Hack Saw Machines recently installed in our warehouses. Our decision to purchase these new Marvel saws was based on the satisfactory performance we have been receiving for the past 10 years from our original Marvel machines.
In our business of warehouse distribution of carbon, alloy and stainless steel bars and tubes, we are called upon to make accurate cut lengths for customers, and on numerous occasions handle orders for hundreds and sometimes thousands of multiple cut pieces. Our Marvel saws help us to rapidly and efficiently handle such sawing requirements.
Marvel saws and high-speed edge hack saw blades are giving satisfactory performance in all our warehouses, and your service has been most cooperative.
Very truly yours,
PETER A. FRASSE AND CO., INC.
W. H. Davis
Assistant Vice President
WHD/are
MARVEL Saws Speed-up Deliveries
You will get cut-off lengths in any quantity faster from the steel warehouses and stockrooms that are equipped with MARVEL 6A and 9A Automatic Hack Saws. Far faster, floor to floor, than any other hack saws, they save valuable machine hours by reducing cutting-off time to a fraction,—save other machining hours by producing accurately cut pieces of exact length.
See our CATALOG in SWEET'S FILE
ARMSTRONG-BLUM MFG. COMPANY
"The Hack Saw People"
5700 BLOOMINGDALE AVENUE
CHICAGO 39, U.S.A.
Metal Cutting
MARVEL SAWS
Better Machines-Better Blades

Demand for 2 and 4-inch pipe has declined in the past 30 days.

San Francisco—Supply of casing and steel tubing to cover needs of oil companies is tight. Pipeline builders are facing a shutdown on many projects soon, because of the limited supply of large diameter pipe.

Seattle—Cast iron pipe demand is slow, due to seasonal conditions and well stocked position of large buyers. Agencies are now in position to make prompt deliveries. Some small orders are moving out of stock.

Structural Shapes . . .

Structural Shape Prices, Page 185

Pittsburgh—Structural fabricators not strike-bound have been able to maintain fairly satisfactory operations. New jobs taken on have been restricted chiefly to those requiring standard specifications. There is good prospect fabricating activity soon will have to be curtailed should the strike continue. Wide flange beams are in shortest supply. A number of large scale industrial expansion programs have been held up because of the strike and this situation likely will become more pronounced before mills again resume normal operations.

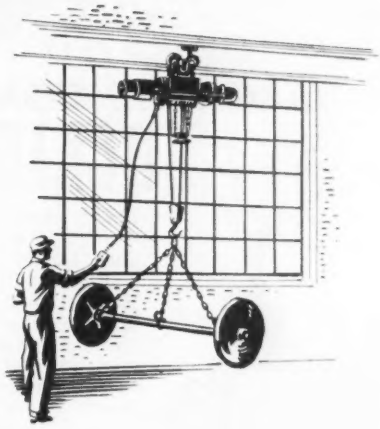
Boston—State bridges, Attleboro and Leominster, Mass., account for 1000 tons while the Sullivan Square, Boston, project to be out shortly under two contracts takes 2250 tons. Bulk of work being estimated is for bridges with scattering contracts for 300 tons or less going to district structural shops; latter will not be seriously effected by lack of plain material with resumption of shipments on standard shapes likely to start late this month or early December against new orders. Deliveries on wide flanged beams will be somewhat more extended.

New York—Structural demand is less active and is dominated primarily by public work, including various bridge jobs and several schools. The largest individual school job is the New York University law center, Washington Square, requiring an estimated 1500 tons. This project is being revived after several months, with a revision in original plans.

Philadelphia — Structural business is particularly slack at the moment. A fair volume of inquiries, chiefly public inquiry, is noted but awards have been negeligible. Resumption of operations by the leading eastern producer holds promise of fairly early relief in the supply of shapes. Some tonnage is expected to be moving shortly, although on new orders it appears doubtful if much can be done under six weeks. Practically all fabricators have been able to maintain operations since the beginning of the steel strike and, in a number of instances, they should now be able to continue on without too much difficulty. They admit it will be touch and go on certain sizes, but believe they can shift their work sufficiently to support current operations.

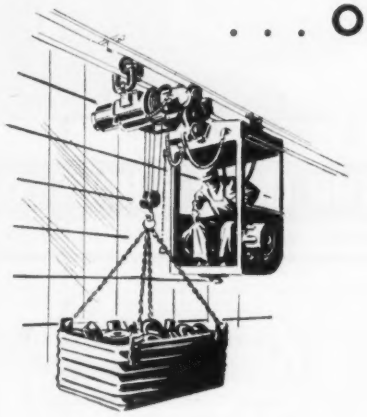
Los Angeles—With Kaiser Steel Corp., Pacific States Steel Corp., and small fabricating shops active, structural supplies are ample. Spot shortages are quickly erased. Numerous small projects and several large ones

THEY LIFT THE SAME LOAD
BUT THEIR RUNNING COSTS DIFFER—



On the floor control, with the operator primarily occupied with other duties.

. . . OR



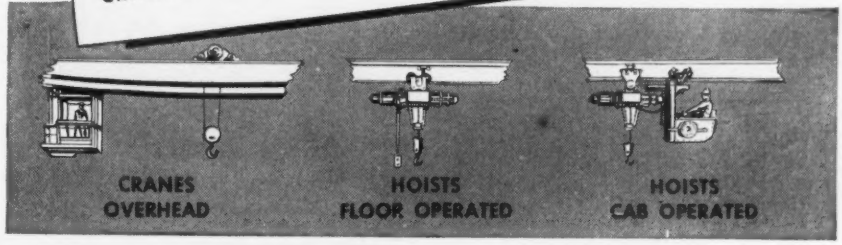
The operator in the cab, traveling loads at speeds up to 500 f.p.m. or more and occupying a better vantage point for spotting or stacking.

It's not always easy to forecast which type of service will best fill the bill.

Let the Shepard Niles specialist show you pertinent data on typical installations. He sells both types of hoist and overhead cranes as well, so he approaches your materials handling problem with an open, unprejudiced mind.

SHEPARD NILES
CRANE AND HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads.



358 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

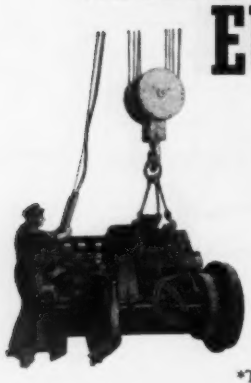
UNIVERSITY OF MICHIGAN LIBRARIES

FINGERS MOVE TONS...

INCHES OR FEET WITH THIS FLOOR OPERATED

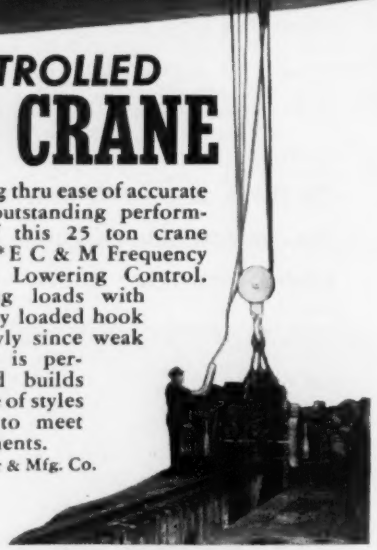
MAGNETIC CONTROLLED

EUCLID CRANE



Spot-Positioning thru ease of accurate control is an outstanding performance feature of this 25 ton crane equipped with *E C & M Frequency Relay Dynamic Lowering Control. Non-overhauling loads with empty or slightly loaded hook start down slowly since weak "down power" is permissible. Euclid builds cranes in a range of styles and capacities to meet varied requirements.

*The Electric Controller & Mfg. Co.



EUCLID CRANES AND HOISTS Raise Profits

THE EUCLID CRANE & HOIST CO.

1364 CHARDON ROAD • EUCLID, OHIO

"What's so good about H-VW-M cobalt nickel plating processes?"

Richard E. Waite, Field Representative
H-VW-M Rochester Office

When a customer asks that question, he's *really* talking my language. There's no H-VW-M process I'd rather discuss than Cobalt-Nickel, especially the 9-H bath.

"Take plating costs, for instance. 9-H Cobalt-Nickel saves you money because no expensive brighteners, wetting agents, or anti-pitting agents are required. Besides, costly purification shutdowns can be eliminated because the Cobalt-Nickel processes are the only commercial plating baths which can be continuously purified without removing or destroying the active brightening agents.

"And look at your operating range. The composition, pH and operating conditions can be altered to give moderately hard or relatively soft deposits; full brightness or easily-buffed semi-bright deposits. The current density range is limited only by your equipment. And also important . . . Cobalt-Nickel baths can be 100% analyzed and scientifically controlled.

"You say, 'How about results?' Well, for one thing 9-H never produces striated deposits as other nickels do. Instead, the result is always a fine-grained structure containing no organic inclusion . . . better corrosion resistance . . . better even than ordinary buffed nickel. And for even greater fineness of color, additional corrosion resistance and a harder finish, use H-VW-M No. 5 or H-VW-M Type AA Processes.

"And remember . . . H-VW-M works with you all the way . . . shows you how to set up for real low-cost operation with 9-H or any of the other H-VW-M Cobalt-Nickel Plating Processes."

Ask your H-VW-M representative, or write to "Headquarters," for Bulletin G-102, or Cobalt-Nickel Plating Processes.

*Hanson-Van Winkle-Munning has supplied the plating industry for over 70 years. Our sales-engineers are thoroughly familiar with *every* step in the process of electroplating and polishing. It is this *overall* knowledge that has made H-VW-M "Headquarters" for electroplating and polishing equipment, supplies and technical assistance.

SINCE 1870

HANSON-VAN WINKLE-MUNNING COMPANY
MATAWAN, NEW JERSEY
Manufacturers of
a complete line of electroplating and polishing equipment and supplies
Plants: Matawan, New Jersey • Anderson, Indiana
Sales Offices: Anderson • Chicago • Cleveland • Dayton • Detroit
Grand Rapids • Matawan • Milwaukee • New Haven • New York • Philadelphia
Pittsburgh • Rochester • Springfield (Mass.) • Stratford (Conn.) • Utica

5862

are under way.

Seattle-Pacific Car & Foundry Co., Seattle, has resumed fabricating after a fire with practically no delay in deliveries. Some small jobs under 100 tons each are pending and considerable major tonnages are involved in proposed government projects in the Pacific Northwest, including the Hanford plant military installations in Alaska. The largest fabricators report about a 60 day materials backlog.

San Francisco — Inventories of structurals remain fairly good. Industrial and commercial building here is estimated 10 to 15 per cent under last year at this time. Some deferred projects are being reconsidered.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 185

Seattle—Rolling mill production has been reduced by a 10-day shutdown of Northwest Steel Rolling Mills' electric furnaces for repairs. The mill is rolling part time, as ingots are available. Inquiry for small tonnages of reinforcing bars is fair, but seasonal conditions have decreased buying interest. Demand for merchant bars is fair.

Steel Bars . . .

Bar Prices, Page 185

Philadelphia—With few exceptions, hot carbon bar mills are promising delivery against new orders within six to eight weeks from time of resumption, and even better on the heavier sizes. Certain producers have committed themselves well into the first quarter. Cold drawers, who have been forced down, are expected to do better on most sizes, since their inventories were in fairly good shape at the time employees walked out. Those who have been able to operate have had to carry a heavy load but, with the exception of wire and some products requiring special grinding, they are in position to make deliveries within possibly three to four weeks. Shipments on some specifications will become worse before they improve because they will be unable to make sufficient replacements of hot material in time.

Boston—Carbon bar mill backlogs are heavier as strikes have smoked out some protective buying. With resumption of rolling, shipments of hot-rolled are likely in about six weeks on smaller and medium sizes while cold-finished bar deliveries will start in less time. Latter mills have fairly substantial stocks. Bookings of alloys have been limited.

Cleveland — Steel bar demand is stronger than it was pre-strike. Order accumulations in hot-rolled carbon and alloy, as well as cold-finished bars, are substantial. Producers can hardly be expected to get back to normal production and shipping schedules in much under four weeks after the strike. Consequently, some tonnage scheduled for November-December shipment will back into January, possibly beyond. Cold-finished bar inventories have been shaved, though some consumers and warehouses are holding substantial stocks. The cold-finishers generally

are accepting new business for delivery six to eight weeks after the hot mills resume production, but are not guaranteeing delivery dates. Active demand well into first half of 1950 is anticipated.

Semifinished Steel . . .

Semifinished Prices, Page 185

Detroit—"Conversion" steel is coming back into the picture as automotive companies exhaust their inventories of finished steel and prospects fade for additional tonnage from established mill sources inside of three to five weeks. Chrysler has made arrangements to buy 20,000 tons of electric furnace ingots for conversion into sheet and strip. Rotary Electric Steel Co., here, in the past has supplied large tonnages of conversion ingots.

Cleveland—Anticipating tight steel supply conditions over the next four to six months, especially in flat-rolled products, consumers are displaying renewed interest in conversion ingot. Last week automotive interests were nibbling at the conversion market and it was reported at least one tonnage was placed. Ford Motor was among those reported considering conversion tonnage.

Wire . . .

Wire Prices, Page 187

Boston — Shipping deferments are appearing for high carbon tonnage from the automobile industry. Bookings of wire mills operating are heavy while those down take substantial orders without definite delivery promises. Rescheduling will be widespread. Lack of other types of steel is affecting orders for some fasteners which carries back to wire mills.

New York—Drastic rescheduling, with orders on books at time of suspensions set back four to five weeks, confronts wire mills as production is resumed. Bookings during October were heavy, and, some producers are well booked through first quarter on many wire products and rods. Nails extend into second quarter.

Chicago—Forward ordering in wire products reaches into next quarter. Merchant product sales have accelerated at retail level, making likely a return to quotas. Nails are tightest in merchant wire line, some builders being completely out of specific sizes. Field stocks of posts and fencing are estimated over 30 days.

Plates . . .

Plate Prices, Page 185

Boston—Resumption of plate shipments will vary with individual mills, but some will be delivering tonnage before the month ends; backlogs on mills when strikes halted output were not heavy. Orders are heavier but, despite declining inventories, buying has not been too brisk during mill suspensions. Paradoxically, carbon plate tonnages have been offered from surplus stocks near mill prices. Maryland Drydock Co., Baltimore, has the contract for hull and superstructure for a small steamer, placed by New Bedford, Martha's Vineyard & Nantucket Steamship Authority.

New York—Eastern plate mill production has been given a substantial boost by resumption of operations by Bethlehem Steel Co. A further boost may come in the near future, as labor negotiations have been resumed at the plants of the Lukens Steel Co., Coatesville, Pa., and Worth Steel Co., Claymont, Del., the only two other plate makers in the east not already in operation. Meanwhile, demand remains slack, with mills in operation promising deliveries before year end.

Philadelphia—Most plate producers who have been forced down by strike can offer delivery against new orders within three weeks. The two producers in this district, who have not been forced down, are able to accept December tonnage. This reflects a continued lag in plate demand, due to absence of interest by some of the leading consumer groups, such as railroads, shipyards, and oil and gas equipment manufacturers. Demand for fuel oil tanks, which has been the mainstay of the market over recent weeks, is now easier.

Los Angeles—Plate supplies are pretty well depleted in several categories. Kaiser's Fontana mill expects to allocate through December, possibly January. There are indications of increased requirements for light gage plate by tank fabricators and jobbers.

HALLDEN
Automatic Shears

CUSTOM BUILT SHEARS
FOR ANY APPLICATION

Hallden Automatic Flattening and Cutting Off Machines can be built into lines requiring special shearing applications.

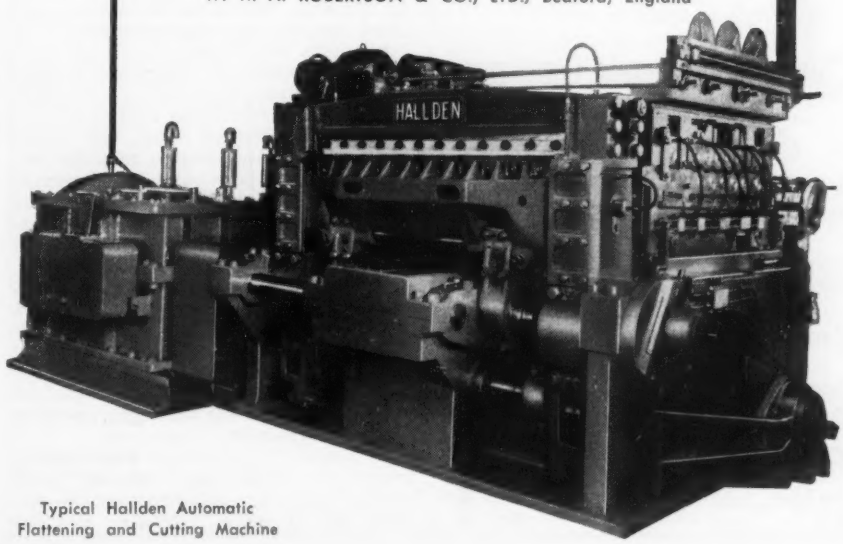
Hallden Automatic Shears are designed to permit continuous feed of metal through the machine by synchronizing the flattener with the flying shear. Cutting accuracy can be held to plus or minus 1/64".

Hallden Shears are self-contained units which, under normal operation, require little maintenance other than lubrication.

Hallden's flexible design allows quick changing of shear knives and easy removal of flattening rolls for grinding. The shear knives always move in a mutual plane.

If you have a shearing problem, consult Hallden, *the shearing specialists.*

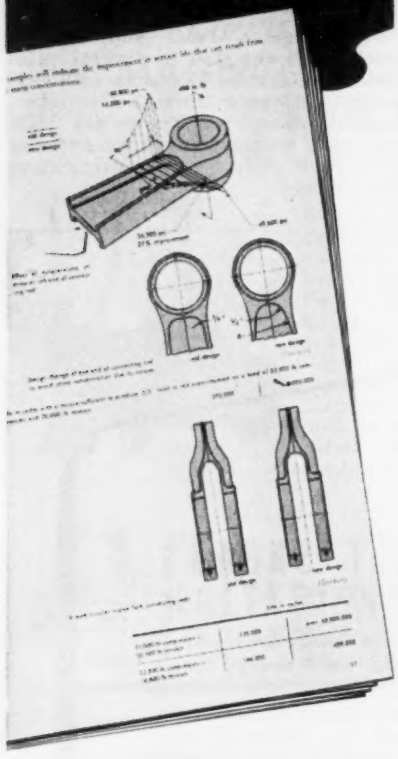
THE HALLDEN MACHINE COMPANY
Thomaston, Conn.
Sales Representatives
THE WEAN ENGINEERING CO. INC., Warren, Ohio
T. E. DODD, Pittsburgh, Pa.
W. H. A. ROBERTSON & CO., LTD., Bedford, England



Typical Hallden Automatic
Flattening and Cutting Machine

UNIVERSITY OF MICHIGAN LIBRARIES

WHAT ABOUT STRESS RAISERS?
This book gives the answers..



How to avoid the localized stresses which start failure is a basic problem of design. This 72 page booklet analyzes many good and bad features of design. It also deals with problems of steel selection and treatment from the viewpoint of the design engineer —instead of the metallurgist.

Write for "3 Keys to Satisfaction"—it is free.

Climax Molybdenum Company
500 Fifth Avenue · New York City

Please send your
FREE BOOKLET
3 KEYS TO SATISFACTION

Name.....
Position.....
Company.....
Address.....

MOLY

S-11 (R) F21

Pig Iron . . .

Pig Iron Prices, Page 184

Boston—Although source of basic iron has been closed more than a month, consumers will manage to maintain operations, although one steelworks will be nearly out before new tonnage arrives. Changes in open-hearth practice at one works means heavier use of cupola hot metal and lower pig iron reserve; this plant has produced steel at 100 per cent capacity throughout the strike. Foundry melt holds to improved volume started in late summer, but has leveled off. Bulk of Mystic production last month went to consumers and less iron is going into stockpile.

New York—Bethlehem Steel Co. was able to resume operations by late last week of all furnaces forced down by the strike. Foundry melt is being maintained at a steady level, with most consumers in fairly comfortable position with regard to supply.

Buffalo—Pressure for delivery of merchant iron is not urgent. Manufacturers are placing smaller orders for castings and, as a result, foundries' iron inventories are ample to cover present requirements. The coke shortage continues as a serious threat to production.

Philadelphia — With Bethlehem Steel Co. having reached an agreement with CIO, blast furnace production in this district is due for a sharp spurt. Its furnaces generally were banked and, consequently, production of iron will be resumed much faster than otherwise. Much of this iron will go to meet the company's own needs for the present.

Pittsburgh—Captive steel mill equipment foundries and those serving the enamelware and radiation industry are active while jobbing concerns and those supplying castings to the railroad, farm implement, ingot mold and other industries are operating at a low rate. Coke supply is chief production bottleneck among those interests still operating near capacity. Merchant pig iron output has not been significantly curtailed during strike period to date.

Cleveland—Foundries are comfortably supplied with iron and no serious shortage has threatened throughout the period of the strike, because most merchant producers continued to operate. A few "hold" orders have been received by the foundries from customers preparing to curtail operations because of unbalanced steel and component inventories. Promptness with which these orders are reactivated depends upon the speed with which steel begins moving into consumption once the steel strike ends. Steelworks blast furnaces will get back into production quickly at strike's end since the stacks have been banked, not blown out.

Cincinnati—Foundry melt is being sustained fairly well in this district, but increasingly urgent calls for coke indicate curtailments are near at hand. Shipments of pig irons are close to previous levels and foundries are accepting all tonnages, seeking to build reserves.

Chicago—Foundrymen are ordering relatively little pig iron for post-strike delivery. Chokepoint in operations is coke. Several Chicago

For every metal-cleaning job there is an efficient Oakite method:

- Precleaning in tanks
- Precleaning in machines
- * Alkaline cleaning in tanks
- Alkaline cleaning in machines
- Pickling
- Barrel cleaning
- Electrocleaning
- Pre-paint treatment in tanks
- Pre-paint treatment in machines
- Steam-gun cleaning
- Paint stripping

FOR MORE INFORMATION about these and other processes—burnishing, anti-rusting, controlling water-wash in paint spray booths, cooling and lubricating machining and grinding operations—consult the Oakite Technical Service Representative in your vicinity or write for descriptive literature.

OAKITE PRODUCTS, INC.
30H Thames Street, NEW YORK 6, N. Y.
Technical Service Representatives Located in Principal Cities of United States and Canada

OAKITE

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

shops are on their last car of coke and would have exhausted supplies sooner had customers not held up order releases. Makers of heavy industrial machinery, machine tools and similar items have not noticeably reduced casting purchases. Two-day foundry operations are not uncommon.

St. Louis—Koppers Co. may blow in its B furnace in two weeks. Operations at 60 per cent of capacity the last two months have cut its ground stocks sharply. Coke supplies are adequate for another month at the present rate, and some good coking coal is obtainable, though at an almost prohibitive premium price. October pig iron sales here were the best since March.

San Francisco—Producers of castings, drop forgings and steel wheels anticipate a severe shortage of pig iron. A lengthy period will elapse after the strike before the flow of pig iron returns to normal. Supplies of iron in the hands of several big shops is sufficient for normal production into December.

Iron Ore . . .

Iron Ore Prices, Page 188

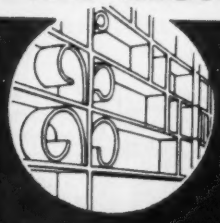
Cleveland—The Bethlehem pension agreement has not changed the tie-up in lake ore shipping. Ore freighters will remain idle until ore miners return to work and, even then, weather conditions and furnace stocks will determine the number of vessels that will return to service for possibly a maximum of two trips. Stocks totaled about 45,356,000 tons Oct. 1 compared with 40,923,499 tons a year ago. Consumption during October was negligible compared with 7,398,055 tons in October, 1948. Shipping of ore had begun to taper prior to the strike as the normal sequence to a decline in consumption. Shipments during the week ended Oct. 31 amounted to 15,523 tons, all from Escanaba. A small tonnage which had been held on dock at Marquette is being brought down. Canadian ports shipped 47,130 tons during the final week of October. Total shipments for the season through last month came to 68,275,856 tons against 75,069,478 tons for the like period a year ago.

Refractories . . .

Refractories Prices, Page 188

Cleveland—Refractory interests anticipate spirited demand for furnace brick once the steel strike ends. All signs last week pointed to a rush of specifying against suspended orders for materials needed to put furnaces in shape to resume production. Post-strike repair work likely will be extensive. Last week one district steelmaker started to specify delivery against orders suspended at the outbreak of the strike. All steelmakers have contracts with suppliers for refractories to be delivered over specified periods. These contracts cover materials needed for normal repair work. In view of the added repairs likely to result from the strike suspension, it would not be surprising if these standing refractory contracts were enlarged substantially.

IF IT'S IRON OR STEEL

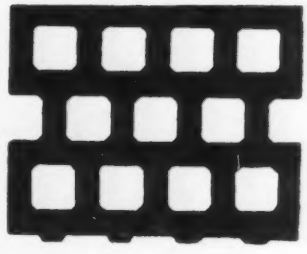


REMEMBER to have it HOT DIP GALVANIZED

(DIPPED IN MOLTEN ZINC)

A *heavy* coating of zinc applied to iron or steel by the Hot-Dip Galvanizing process provides the utmost protection against rust. Molten zinc forms a perfect bond with the metal, providing an effective seal against corrosive action of the elements. For an economical top-grade job of genuine Hot-Dip Galvanizing, send your materials to a member of the American Hot Dip Galvanizers Association. List of members available at Association's headquarters in the First National Bank Bldg., Pittsburgh 22, Pa.

Perforated metal screens for any requirement



WITH facilities for producing any shape and size of perforations in any commercially rolled metal, of whatever gauge desired, Hendrick can furnish the most suitable form for a specific screening application.

To best meet certain requirements, Hendrick developed the "squaround" perforation illustrated. Other standard forms include round, square, hexagonal, diamond and slot perforations in hundreds of sizes of openings. Write for full information.

SEE OUR CATALOG IN SWEET'S

HENDRICK Manufacturing Company

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

30 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

UNIVERSITY OF MICHIGAN LIBRARIES

INCREASE YOUR PROFITS BY SALVAGING COIL ENDS

This PAXSON SLITTER LINE operating at McCARTHY STEEL WAREHOUSE CO., 7410 S. Ashland Ave., Chicago 36, Ill.

No other strip steel slitter can match Paxson's performance, because Paxson is built to cut the coil without waste. Paxson gives you the EDGE; every pound of metal can be put to use. Easily adjusted, you can slit widths up from 1/2 inch at a high rate of speed. Get the details today. Write, wire or phone if you want to talk to H. D. Paxson personally. Paxson will be glad to discuss your problems with you.

PAXSON GIVES YOU THE EDGE!

PAXSON MACHINE CO.
Salem, Ohio

SNAGGING

Get on with production. Do your snagging quicker, cleaner, *safer!* With Electro HIGH SPEED SNAGGING WHEELS *engineered to your job,* you'll see costs come down and volume of *better output* go up. These wheels work *on* anything *from* anything—swing frames, floor stands or portable machines. Full details illustrated in full color in our new Grinding Wheel Manual No. 645. Send for it *now.* It's *free.*

Service from Los Angeles or Buffalo

Electro SINCE 1919

X-335

Electro REFRACTORIES & ALLOYS CORPORATION
Mfrs. • Refractories • (High Speed Grinding Wheels) • Crucibles • Alloys
344 DELAWARE AVE. BUFFALO 2, N. Y.

Scrap . . .

Stronger price tone develops on broad front. Some railroad scrap items rise $1 to $3

Scrap Prices, Page 192

Pittsburgh—A stronger price tone has developed in the scrap market and moderately higher price levels are expected when leading consumers resume operations. Dealers are holding on to what little scrap they have been accumulating in speculation of higher prices. Some mills are able to pick up small lots of No. 1 heavy melting at $29 and remote material is being delivered at $30, up $1. Some indication of the probable trend in prices is revealed on awards of railroad items last week to Valley consumers at $1 to $3 above previous lists. None of these items went to consumers here. No activity is noted in cast iron. Crushers' buying prices on machine and mixed borings have been raised to a range of $21.50 to $22, while short shovel turnings have advanced to $23 to $24.

Philadelphia—With prospects for a return to fairly normal steelmaking operations in this district shortly, steel scrap prices are stronger. Trading is featured by a substantial order for No. 1 heavy melting steel at $25, delivered, or about the prestrike level. On some of the older orders, brokers and dealers are now having to cover at as much as they sold the tonnage for.

Some trading is noted in other major open-hearth grades, with No. 2 heavy melting and No. 1 busheling at $23, No. 1 bundles at $25, and No. 2 at $22. Machine shop turnings and short shovel turnings are unchanged although mixed borings and turnings have advanced to $16. Cut structurals are higher at $25-$26 and electric furnace bundles and heavy turnings at $25.

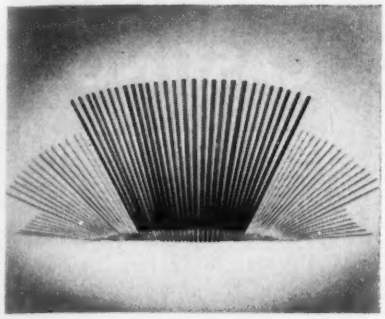
Bethlehem Steel Co. is expected to issue releases against old orders momentarily. Meanwhile, it is moving in fairly substantial quantities of scrap which it has been holding under demurrage on cars from industrial producing plants which lacked storage space.

Cast grades are generally higher, with No. 1 cupola at $35, delivered, No. 1 machinery cast, $38-$39; charging box and heavy breakable cast $35; unstripped motor blocks, $30; clean auto cast $38-$39; No. 1 wheels, $38; malleable $37. There has been some trading in all lines.

Boston — Steelmaking scrap is firmer but the better tone is not reflected in cast iron grades. Turnings lag behind other steel grades. District steel scrap consumers are buying carlots while for the Pittsburgh area, brokers are paying just under $19 shipping point for No. 1 and $17 for No. 2. District foundries are showing slight interest in cast grades; halted operations at the Everett cast pipe foundry contributes to inactivity. For outside shipment, brokers offer around $25.50 for mixed cast.

New York—Brokers are advancing their buying prices, with offerings of at least $20, f.o.b. shipping point, on No. 1 heavy melting steel and $18 for No. 2 heavy melting. They are of-

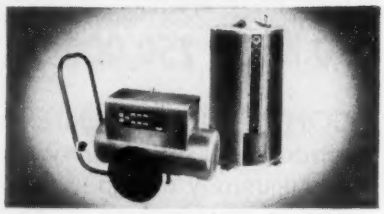
FACTS AVAILABLE ON "SELECT 70"



DESCRIPTIVE literature covering mild steel, low alloy and special steel, stainless steel, hard surfacing and build up and other special electrodes is available to those requesting full information on M & T's "SELECT 70"—seventy electrodes designed to cover all arc welding requirements—AC or DC, all-position or downhand work welding of mild steel, low alloys and stainless steels as well as hard surfacing and building up of worn parts.

Literature is brief but comprehensive, covering specifications, properties and applications for each electrode. Copies available on request received on company letterhead. Address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

NEW ARC WELDERS BOOST AC and DC PERFORMANCE



FASTER welding, better quality welds, lower power costs, and simplified maintenance are furnished by a new line of AC and DC arc welders introduced by Metal and Thermit Corporation.

Built-in capacitors for high power factor, wide current range for full rated output—and fingertip, stepless current control for precise current setting are featured in the AC units. Available in 150 to 500 amp models for manual arc welding, additional models for inert arc and automatic welding.

Full capacity, rugged duty DC arc welders are compact, light in weight—half the size and half the weight of older types—and are equipped with simplified current control, automatic electrode selector. Furnished in 150 to 400 amp sets—motor driven, engine driven or belt-drive.

Descriptive folder gives full particulars. Address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

Advertisement

offering around $16 for No. 1 busheling, $20 for No. 1 bundles and $16 for No. 2 bundles. Electric furnace bundles are higher at $20-$21, delivered. Malleable cast has jumped to $35, f.o.b. shipping point, but brokers' offerings for other cast grades are unchanged.

Buffalo—The leading local buyer of cast material has lowered bid prices $4 from prestrike levels. A steady undertone continues to rule in steelmaking items. Dealers are having little success in trying to lower prices to protect themselves against additional handling costs.

Cleveland—Stronger undertone has developed in the local scrap market with No. 1 heavy melting nominally $26.50. Upward revision is based on sales by brokers here to mills outside the district, No. 1 heavy melting having moved on the basis of $28, f.o.b. Cleveland. Republic Steel Corp. is not buying and does not expect to be in the market for shipments over the remainder of this year. Tonnage offered by railroads has declined, due partly to layoffs of many workers. Latest offerings were bought by brokers at $33 for prepared No. 1 heavy melting and $30 for unprepared material. A major railroad got $41 for malleable. Rerollers have been buying substantial tonnages of scrap rails. No. 1 cupola cast is quoted $43 to $44.

Detroit—While no substantial sales are reported, undertone of the scrap market is strong and will move further in this direction in the face of accelerated demand from mills as they return to production. Another factor will be shorter supplies from automotive plants which are cutting back or suspending operations. On the basis of current broker sentiment, the entire list is at least $1 stronger.

Cincinnati—Some scrap buying is being done, with resulting higher prices on some grades. Flow of tonnage is sluggish, with industrial scrap dwindling. Dealers are seeking heavier yard stocks in anticipation of an active market once the strikes are ended. Foundry demand is in the doldrums, with quotations on cast grades unchanged.

Chicago—Consumer prices are beginning to catch up with brokers' buying prices. Some brokers are offering $31 and over for No. 1 steel, but many dealers are unwilling to accept this figure. End of the strike may signal a rise to $35 or beyond. Dealers' yards are crammed, but scrap generation is dropping rapidly and receipts are down to a trickle.

One railroad list last week brought prices generally $3 to $4 above last month's levels. No. 1 heavy melting was awarded for just under $29 a net ton on track; rerolling rails, $40; malleable, about $32, net ton on track.

St. Louis—Prices of rail scrap have picked up under the pressure of higher demand since settlement of the six-week strike on the Missouri Pacific Railroad. Increases range from $1 on random length rails to $3 on angle bars. Cast prices are steady. Foundries are still on erratic work weeks and many tapered their scrap buying when they found the steel strike prevented their products being received in some markets. Scrap movement is heavy on the fill-

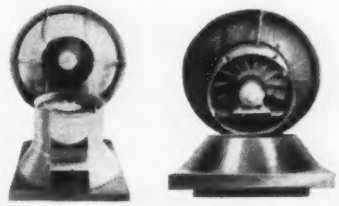
Controlled Ventilation

Keep workers alert and increase efficiency by providing adequate fresh air in your buildings. CONTROLLED ventilation is assured with the Power-Flow Roof Ventilator, a motor-driven fan in a weather-proof housing. Unlike gravity type ventilators, Power-Flow is not dependent upon wind or pressure.

LOW STREAMLINED DESIGN — blends well with modern architectural designs.

GREATER AIR DISCHARGE PER H.P. —Power-Flow exhausts more air per brake horsepower than other roof ventilators and works efficiently with or without duct system.

EASY ACCESS FOR INSPECTION — Power-Flow Roof Ventilators are hinged in two places. All working parts easily accessible for inspection and lubrication.



With Head Open *With Housing Open*

All Power-Flow capacity ratings are certified according to PFMA code.

FREE CATALOG "Power-Flow" ROOF VENTILATORS

DEBOTHEZAT FANS DIV., Dept. F-11
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

Please rush, without obligation, new illustrated catalog on Power-Flow Roof Ventilators.

Firm_____

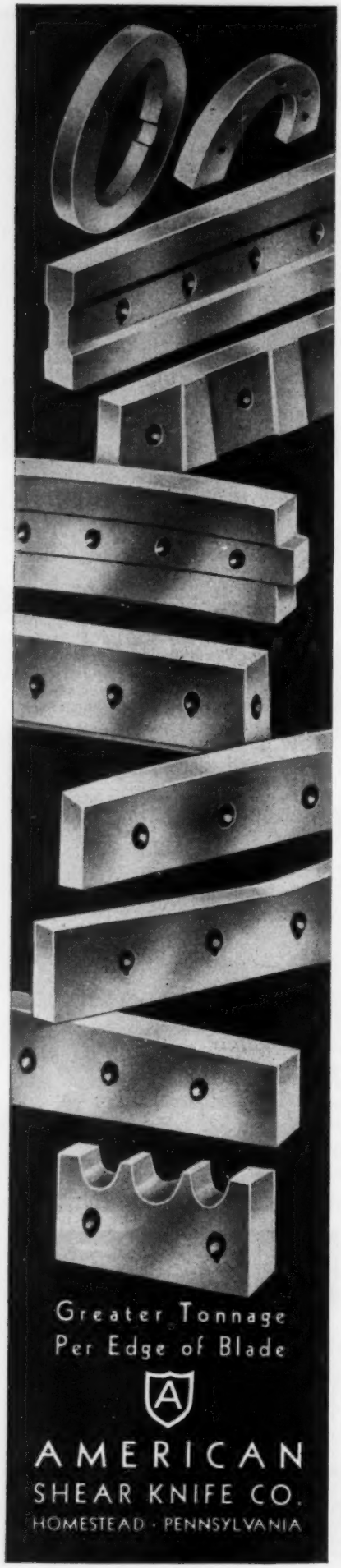
Address_____

City and Zone_____

State_____

Sender's Name_____

UNIVERSITY OF MICHIGAN LIBRARIES



ing of October orders which lapped into November. Considerable material moved here because it couldn't move elsewhere during the strike. Steel mills in this district now have around 60-day supply of scrap. Dealer sentiment is that the strike's end will boom the scrap market for winter buying. A $1 drop in machine turnings last week was attributed to a decline in speculative interest.

Los Angeles—Dealers look for considerably increased scrap demand when mills resume operation, but they anticipate difficulty in meeting requirements. Collections have lagged for months and stockpiles generally are low. Kaiser is buying on a substantial scale. Prices are steady.

Seattle—The scrap market is inactive and prices are unchanged. The principal buyer is not quoting and turnover has been radically reduced. Other buyers report ample offerings.

Warehouse . . .

Warehouse Prices, Page 183

New York—Bulge in warehouse demand is spotty with drain on sheet, pipe and nail stocks heavy. Inventories of these products are depleted. Buying of bars, plates and structurals has not kept pace, although somewhat more active. Alloy stocks are not seriously taxed. In matter of replacements not too extended delay is expected in nails, but difficulty will be experienced in flat-rolled.

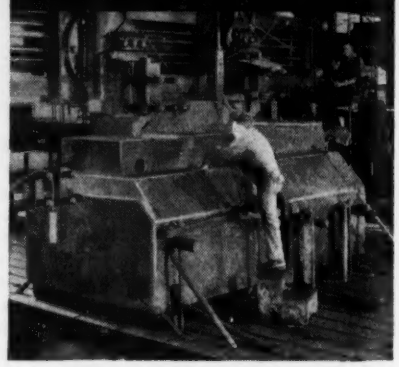
Pittsburgh—Those steel distributors idled since Oct. 1 should be in position to help supplement badly depleted consumer inventories once the strike issue is settled. Despite effort to ration steadily dwindling stocks, those warehouses operating throughout the strike period report flat-rolled steel items and wide flange beams no longer are available. Shipments out of warehouse stocks generally have been restricted to regular customers.

Cleveland—Local warehouse inventories in some products are badly unbalanced as result of the heavy drain over the past month. It will take jobbers 60 to 90 days to rebuild their supply position to prestrike levels. Sheet and strip stocks of some houses are virtually gone. Carbon bar supplies are somewhat better than flat-rolled, but are unbalanced. Cold-finished bar inventories are described as good but spotty and down from prestrike level. Alloys have been moving sluggishly and consequently, with supplies comfortable, no supply difficulties in this direction are anticipated. Warehouse distributors anticipate active demand for the next five to six months.

Cincinnati—Warehouse stocks are showing the effects of abnormal demands which continue. Sheets and almost all buildings items are gone from inventories. Stocks of plates are badly out of balance. A fair supply of bars remains. A strike, choking off deliveries from one major jobbing interest, is a factor in shortages.

Milwaukee—Shortages, spreading beyond cold-rolled, galvanized and hot-rolled sheets, have developed with some distributors. Plates as thick as ⅝-inch are running low and stringency is greater as thickness is reduced. Spot shortages in wide flange

"Umpteen" Sizes of
MACHINED
CASTINGS
your problem?



Continental
CASTING AND
MACHINING
FACILITIES
handle a range
from
50 lbs. to 250,000 lbs.

CONTINENTAL regularly produces all sizes of intricate and unusually designed castings in any analysis of cast steel and in sizes from 50 lbs. to 250,000 lbs. Three large capacity foundries keyed to either custom or production operation and two heavy-duty machine shops offer you promptly scheduled delivery on a wide size range of castings to your specification. Send your drawings for quotation.

Continental
FOUNDRY & MACHINE CO.
Chicago · Pittsburgh
Plants at:
East Chicago, Ind.; Wheeling, W. Va.; Pittsburgh, Pa.

beams also have developed. Some warehouse customers report no trouble in obtaining requirements of hot bars, cold flats, plates and some angles.

Los Angeles — Warehouse sales bulged during the first two weeks of the steel shutdown, but activity has declined to a level 15 to 20 per cent over that pre-strike. Warehouse stocks of flat-rolled carbon products are low.

San Francisco—Jobbers' stocks are slowly dwindling. Flat-rolled items are getting relatively scarce, but inventories of most other lines are in good balance.

Seattle—Jobbing turnover is spotty. Consumers have replenished stocks and consequently warehouse stocks are down. Materials available are being allocated to the best advantage in serving regular customers.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 188

New York—Bolt and nut plants, not adversely affected by strikes, are confronted with substantial inquiry. Many of the larger bolt and nut makers have been down, with a result that demand is being focused on those who have been able to keep going. Most of the latter are still operating on a single shift basis.

Pittsburgh — Strikebound producers of fasteners have lost considerable business to nonstruck competitors. Prior to Oct. 1, fastener producers had experienced a moderate improvement in order volume, although operating schedules continued to range between 3 to 4 days per week. Competitive conditions are likely to prevent producers from passing along increased wage costs in form of higher prices. An "off the pattern" labor contract settlement has been reached between Pittsburgh Screw & Bolt Co. and CIO-Steelworkers.

Cleveland—Industrial fasteners demand is active with those plants not closed by strikes. Only one major bolt and nut plant in this area is strikebound, that of Republic Steel Corp. All other producers are maintaining operations, but they are beginning to encounter steel inventory difficulties. Some order cutbacks and "holdups" have been received but these have not materially affected production schedules since canceled tonnages are diverted promptly to other needy users. Expectations are four to eight weeks will elapse after the steel strike ends before fastener producers' steel inventories are back to where they were pre-strike. The price tone of the fasteners market is firm with cap screws definitely stronger. Weakness on the latter is reported repidly disappearing.

Canada . . .

Toronto, Ont. — Canadian production of primary iron and steel products totaled 259,887 net tons in July compared with 321,401 tons in June and 276,260 tons in July, 1948. Total shipped for sale in July amounted to 182,658 net tons against 225,468 in June and 206,243 in July, 1948.

During July shipments included

Save Money by Buying Your
SCREW MACHINE PARTS from KEMPSMITH

Now — You can get high-quality screw machine parts from a reliable manufacturer at a substantial saving. In the modern, well-equipped Kempsmith plant, you will find a battery of six spindle automatics from 9/16" to 3½" diameter and single spindle machines from 9/16" to 6¼" diameter. Also plenty of hobbing, splining, broaching and other second operation equipment. These high-speed, precision machines are available to YOU for producing your screw machine parts. They enable you to get costs down to meet competitive bids. All metals can be processed. Send us your blueprints. Our quotation will follow immediately.

KEMPSMITH MACHINE CO., 1859 S. 71st ST., MILWAUKEE 14, WIS., U. S. A.

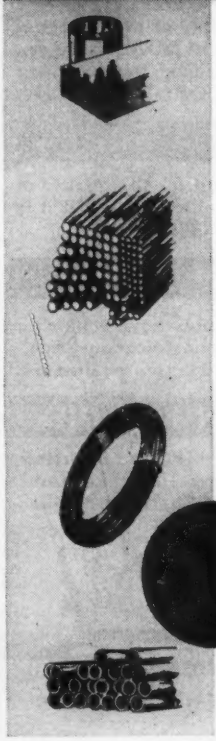
KEMPSMITH

Supplying the Needs of Industry Since 1888

A 5670-1s

PROFITS UP-COSTS DOWN
on Quality
STAINLESS STEEL

STEEL
ALLOY STEEL
ALUMINUM



END PRICE WORRIES

PRICES are still the main topic of conversation . . . FEAST OR FAMINE ON SALES . . . A low cost for production must be attained.

YOU can PROFIT . . . by our prompt delivery . . . prime material . . . savings effected on price.

If it's SHEET—STRIP—ROD—WIRE—TUBING—call on us for your requirements and rest assured—we'll do our level best—be it PRICE—DELIVERY—QUALITY.

Large stocks in principal cities

DEPENDABLE Sales CORPORATION

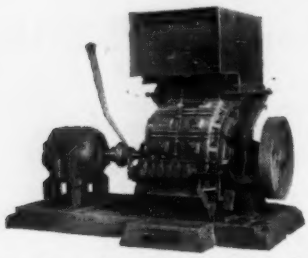
315 Gold St.
Brooklyn 1, New York

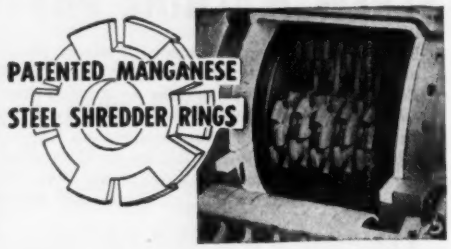
UNIVERSITY OF MICHIGAN LIBRARIES

YOUR METAL TURNINGS [illegible] OR A PROFIT?

The rapid reduction of long, curly, hard-to-handle turnings into short shoveling chips with Americans solves handling and storage problems. The low cost at which Americans operate makes their installation highly profitable. The yield of cutting oil is increased 30 to 50 gallons per ton. Alloy steel, carbon steel, aluminum, brass, and bronze turnings are reduced to uniform chips by Americans in capacities from 1 to 10 TPH

Only Americans have shredder ring action that assures uniform chips and prevents clogging and stalling.





Send for "Metal Turnings Bulletin"

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1539 MACKLIND AVE.
ST. LOUIS 10, MO.

Here's why it PAYS to use FAIRFIELD GEARS

★ MASS PRODUCTION ECONOMY

Large or small, you get the benefits of high production rates and big volume output at FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY!

★ QUALITY PLUS

There is no finer recommendation for the quality of the product you sell than to be able to say that it is "EQUIPPED WITH FAIRFIELD GEARS!"

★ DEPENDABLE SOURCE OF SUPPLY

Supplier of precision-made, automotive type gears for thirty years to leading builders of construction, agricultural, industrial, marine, and automotive equipment.

★ COMPLETE PRODUCTION FACILITIES

Unexcelled facilities for producing Spur, Herringbone, Spiral Bevel, Straight Bevel, Hypoid, Zerol, Worms and Worm Gears, Splined Shafts, and Differentials to your specifications.

FAIRFIELD for FINE GEARS

FAIRFIELD MANUFACTURING CO.
303 S. Earl Ave., Lafayette, Indiana

7173 tons of semifinished shapes, 15,243 structurals, 13,253 plates, 19,553 rails, 5007 tie plates and track materials, 36,449 hot-rolled bars, 16,651 pipes and tubes, 17,872 wire rods, 12,335 black sheets, 7174 galvanized sheets, 6260 castings and 17,746 tons of other rolled products.

Of the amount shipped for sale in July, 35,467 tons went directly to railways and railway car shops; 10,928 to pressing, forming and stamping plants; 21,862 to merchant trade products; 24,831 to building construction; 15,096 to the container industry; 7865 to agricultural equipment; 9375 to the automotive industry; 7691 to machinery plants; 1020 to shipbuilding; 6340 to mining, lumbering, etc., and 931 to miscellaneous industries. Wholesalers and warehousing accounted for 25,963 tons and exports for 13,432.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

640 tons, School No. 165, Queens, New York to Schacht Steel Construction Co. Inc., that city.

470 tons, Workmen's Circle Old Age Home Bronx, New York, to Schacht Steel Construction Co. Inc., that city.

300 tons, sewage plant building, Nut Island, Boston, to Groisser & Shlager Iron Works, Somerville, Mass.; Thomas O'Connor Co., Cambridge, general contractor.

275 tons, Boston Museum of Science building, Boston, to A. O. Wilson Structural Steel Co., Cambridge, Mass.; George B. H. Macomber Co., Boston, general contractor.

250 tons, school, Chappagua, N. Y., to County Iron Works.

210 tons, state bridge, Madison county, New York, to American Bridge Co., Pittsburgh.

175 tons, St. Francis School, Long Island City, N. Y., to Weatherly Steel Co., Weatherly, Pa.

STRUCTURAL STEEL PENDING

1500 tons, estimated, New York University law center, Washington Square, New York; revised plans up for bidding Nov. 15.

1200 tons, Columbia river bridge; bids to U. S. Engineer, Nov. 8.

820 tons, School No. 12, Brooklyn, N. Y.; bids closed Oct. 31.

780 tons, School No. 175, Brooklyn, N. Y.; T. G. K. Construction Co., New York, low on general contract.

700 tons, Washington state bridge, Cowlitz river; bids soon to Olympia.

650 tons, two steel stringer bridges, one deck girder bridge, one plate girder bridge and pedestrian overpass, state highway project, Leominster, Mass.; bids Nov. 8, Boston.

425 tons, School No. 249, Brooklyn, N. Y.; Lawrence J. Rice Construction Co., New York, low on general contract.

360 tons, state highway bridge, Attleboro, Mass.; bids in.

285 tons, angles Navy Department, inv. 1997, delivery western yards; bids Nov. 16.

175 tons, including 75 tons reinforcing bars, relocation 17.8 miles Spokane, Portland & Seattle Railway; bids to U. S. Engineer, Walla Walla, Wash., Dec. 6.

45 tons structural steel and 28,850 square feet of steel sheet piles, section of state roadway, Newark, N. J.; bids Nov. 17.

Unstated tonnage, Public School No. 14, Brooklyn, N. Y.; bids Nov. 12.

REINFORCING BARS . . .

REINFORCING BARS PLACED

448 tons, pumping station, Bedford Park, Ill., through S. N. Nielson Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.

120 tons, Washington state Castle Rock bridge, to Bethlehem Pacific Coast Steel Corp.

ALL METHODS CONSIDERED...

OWEN GRAPPLES

MOST EFFICIENTLY WITH YOUR *SCRAP HANDLING PROBLEM*

OWEN GRAPPLES DO A BIGGER DAY'S WORK

Maximum penetration into scrap assures capacity grabs which are held and lifted in an inescapable grasp.

Independent action permits entire closing power to be concentrated on one tine or distributed among tines where it is most effective. Write for the catalog.

THE OWEN BUCKET CO. 6012 Breakwater Ave., Cleveland, O.

BRANCHES: NEW YORK • PHILADELPHIA • CHICAGO • BERKELEY, CALIF.

MANUFACTURERS OF THE FAMOUS OWEN CLAMSHELL BUCKETS

di-acro PUNCH

NEW DOUBLE PURPOSE PRESS

Available in two sizes 6" and 12" throat depth

Now you can punch holes of various shapes as large as 4" diameter in 16 gauge steel—also blank, draw, emboss, form,—all with the new DI-ACRO Punch. It is ideal for both experimental and production work.

The precision ground triangular ram of this double purpose press prevents punch head from turning, assuring perfect alignment at all times.

A Turret Stripper of exclusive DI-ACRO design automatically strips material from punches of all shapes. Roller Bearing cam action develops 4-ton pressure with minimum effort. Adjustable gauges assure exact location of holes.

Send for **"DIE-LESS DUPLICATING"** *Catalog*

Gives the full story of the DI-ACRO Punch, and also DI-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, as well as the new DI-ACRO Vari-O-Speed Powershear and Hydra-Power Bender.

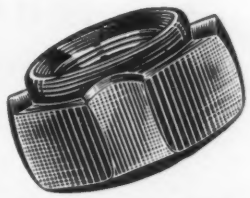
DI-ACRO is pronounced "DIE-ACK-RO"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

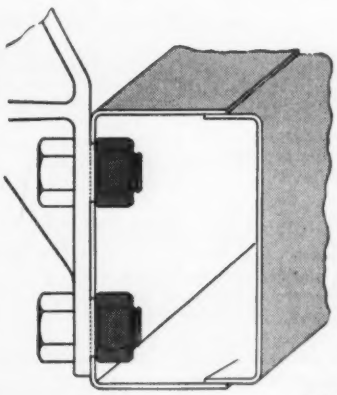
304 EIGHTH AVENUE • LAKE CITY, MINN.

Use



MIDLAND WELDING NUTS

for SPEED and ECONOMY in Assembly of Any Combination of Metal Stampings...



FOR THOSE BLIND SPOTS...

Particularly useful in positions difficult to reach in assembly as shown in this illustration.

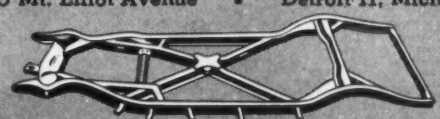
SELF LOCATING QUICKLY POSITIONED

The Midland Welding Nut can be readily assembled to parts, either as a subassembly or on line assembly. Where parts can be handled fast enough a feeding mechanism can be attached to the welding machine for maximum speed in assembly.

Investigate! You may be able to use Midland Welding Nuts profitably. Write, wire or phone us today.

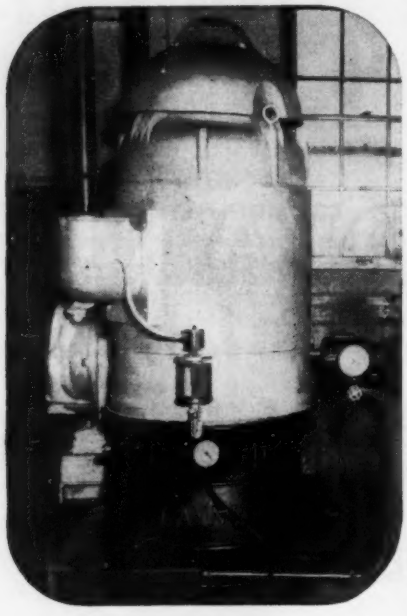
The MIDLAND STEEL PRODUCTS CO.

6660 Mt. Elliot Avenue • Detroit 11, Michigan



WORLD'S LARGEST MANUFACTURERS OF AUTOMOBILE FRAMES—

UNIVERSITY OF MICHIGAN LIBRARIES



What About THE WAY THEY ARE INSTALLED

About 98 percent of a well water system is an underground construction project. Just how good the materials used are, or how poor the well was built, cannot be adequately checked by anyone in your organization. It is a question of depending on the reputation, integrity and skill of the builder.

First, Layne uses well building methods obtained from nearly three quarters of a century of world-wide experience. And second, everything used: casing, shutter screen, shafting, bearings, impellers, motors and controls are of the very finest quality. And furthermore, Layne well water systems are built to produce greater volumes of water than can be obtained from the conventional type of installation.

Layne's "know how" omits guess work and patch ups in construction errors by the less experienced. After the installation has been accepted, you have the long established and responsible Layne organization on which you can depend for repairs, parts or service when and if ever needed. For further information, catalogs, etc., address, LAYNE & BOWLER, INC., General Offices, MEMPHIS 8, TENN.

LAYNE

WELL WATER SYSTEMS

ASSOCIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn., * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wisc. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Wash. * The Layne-Texas Co., Ltd., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Minnesota Co., Minneapolis, Minn. * International Water Corporation, Pittsburgh, Pa. * International Water Supply, Ltd., London, Ont., Can. * Layne-Hispano Americana, S. A., Mexico, D. F. General Filter Company, Ames, Iowa

Seattle; Anderson Bridge Co., Seattle, general contract.

140 tons, Skokie river bridge, Chicago, to United States Steel Supply Co., that city.

113 tons, building, Farm Bureau Co-operative Association, Columbus, O.; to Pollock Steel Co., Cincinnati.

REINFORCING BARS PENDING

2250 tons, Garrison Dam, Bismarck, N. D., U. S. Engineer; bids in Oct. 26.

1100 tons, Benson storm sewer, Omaha, Neb.; bids asked.

461 tons, research hospital, University of Illinois, Chicago; bids asked.

300 tons, grade separation, Edens Superhighway, Chicago; bids asked.

250 tons, building, Certain-Teed Products Co., Clinton, Iowa; bids asked.

225 tons, Central street overhead crossing, Marshalltown, Iowa; bids asked.

195 tons, apartment building, Chicago; bids asked.

150 tons, Illinois state reformatory, Sheridan, Ill.; bids asked.

110 tons, Northern Illinois State Teachers College, Dekalb, Ill.; bids asked.

PLATES . . .

PLATES PLACED

1417 tons, Navy Department, Washington, to Central Iron & Steel Co., Harrisburg, Pa., $132,798.54.

PLATES PENDING

800 tons, Navy Department, east and west yards, inv. 1972; bids Nov. 22.

PIPE . . .

CAST IRON PIPE PLACED

1200 tons, 6 and 8-inch, Attleboro, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

500 tons, 36-inch, water line, Metropolitan District Commission, Malden-Saugus, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

300 tons, treatment plant project, Bremerton, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

2400 tons, 6 to 12-inch, Templeton, Mass., R. D. Wood Co., Florence, N. J., low.

125 tons, also hydrants, etc., 4 and 6 inch; bids in Nov. 1 to Anita Busch, clerk, Edmonds, Wash.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Illinois Terminal, directors have authorized purchase of nine diesel-electric locomotives.

New York Central, unstated number of diesel-electric locomotives, serial contract No. 28-1949; bids Nov. 14.

Pennsylvania-Reading Sea Shore Lines, unstated number diesel-electric locomotives; bids Nov. 7.

RAILROAD CARS PLACED

Great Northern, 66 passenger cars awarded, 30 sleepers to Pullman-Standard Car Mfg. Co., Chicago, and 6 coaches, 6 diners, 6 coffee shop cars, 6 observation cars, 6 baggage cars and 6 baggage-mail cars to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Great Northern, 500 refrigerator cars contemplated.

RAILS PLACED

St. Louis-San Francisco, 27,500 tons, to Tennessee Coal Iron & Railroad Co., Birmingham. Order will be sufficient to lay 75 miles of 132 lb rail and 50 miles of 115 lb rail.

RAILS PENDING

Navy Department, 350 tons, Earle, N. J.; bids Nov. 21, Navy Purchasing Office, New York, inv. 5730.

New York Central, estimated 75,000 tons; bids Nov. 7.

CONSTRUCTION AND ENTERPRISE

ALABAMA

TUSKEGEE, ALA.—Veterans Administration, Washington, has awarded a $208,903 contract to Whaley Co., Birmingham, for construction of an outside steam distribution system for the V-A hospital in Tuskegee.

CONNECTICUT

PORTLAND, CONN.—Pickering Governor Co., manufacturer of governors, has been acquired by Henry & Wright Division, Hartford-Empire Co. Effective Nov. 14 manufacturing and sales will be handled from Henry & Wright headquarters, 760 Windsor St., Hartford, Conn.

OHIO

ALLIANCE, O.—This city is being considered as a possible site of a new industry. George Scheffey, head, Brooks Press Co., presently located in Lansdale, Pa., said he is seeking a building of approximately 6000 sq ft. The firm is engaged in manufacture of high speed punch presses and the stamping business.

ASHTABULA, O.—Ashco Industrial Water Co. has been incorporated and is considering plans for construction of a pumping station, estimated cost $300,000, one and one-half miles east of the mouth of the Ashtabula river. This station would furnish raw lake water to members of the company. At the present time there are only two members, National Distillers Chemical Corp. and Hooker-Detrex Corp., whose plants are being constructed on State road. Incorporators are listed as Charles D. Johnson, W. R. Connelly and John D. Drinko.

CLEVELAND—Uniworld Research Corp. of America has been established at 1302 Ontario St. by Karl Spitz. The company plans to license steel companies to make a new steel alloy.

CLEVELAND—Morrison Industries Inc. has been formed by John R. Morrison, 2976 Manchester Rd., one of the principal owners, and attorneys Gordon F. Basler and Kent H. Meyers. The new firm will manufacture industrial heating equipment.

CLEVELAND — L. L. Copeland, Fairmount Steel Co., 3030 Euclid Ave., has incorporated the business under the name of Fairmount Steel Corp. The company will deal in all kinds of steel.

MT. GILEAD, O.—Hydraulic Press Mfg. Co. has been awarded a contract by National Tube Co., Pittsburgh, for construction of a large hydraulic press. The press will form pipe up to 36 inches in diameter, 40 feet long with a ½-inch wall thickness.

CLEVELAND—Joseph A. Busher of Dial Tool & Die Co., 3500 Lakeside Ave., has formed a new corporation, the Jetrow Co., which will manufacture a hand lift truck. The new firm will start operations in about a month at 3500 Lakeside.

CONNEAUT, O.—Cleveland Electric Illuminating Co., Cleveland, is expected to begin construction work soon on a new substation on Chestnut street, between the New York Central Railroad tracks and Jackson street.

FOSTORIA, O.—Fostoria Screw Co. Inc., new corporation which has taken over the Fostoria Screw Co., plans to close Plant 2, located on S. Union street, and consolidate the manufacturing operations in Plant 1, S. Poplar & Fourth Sts. The purchasing company, Rose-Moskowitz group in Cincinnati, has elected the following officers: S. G. Rose, president; T. L. Moskowitz, vice president; A. J. Buthkes, second vice president; Fred Weiland, secretary; and Joseph Hoodin, treasurer, all of Cincinnati. H. E. Taylor, general manager, will continue in the same capacity.

UTAH

SALT LAKE CITY, UTAH—Work on the major portion of Salt Lake Refining Co.'s $10 million expansion program will begin Mar. 1. The company is a subsidiary of Standard

PRESENTING . .

KARRI-GO!

INDUSTRIAL CRANE

The World's Finest 5-Ton Front Boom Crane At The World's Lowest Price

Send for Bulletin No. 73

Made by the Makers of the KRANE KAR

SILENT HOIST & CRANE CO. 849 63rd ST., BROOKLYN 20, N.Y.

COPPER—BRASS—BRONZE
PERFORATED
TO YOUR REQUIREMENTS

PERFORATED METALS
FOR ALL INDUSTRIAL USES
SEND FOR CATALOG No. 35
ARCHITECTURAL GRILLES

DIAMOND MFG. CO.
BOX 32 WYOMING, PA.

TIN PLATE
COP-R-LOY PIPE-SHEETS
Ductilite
THE MODERN TIN PLATE

WHEELING STEEL CORPORATION
WHEELING, WEST VIRGINIA

Finished, Assembled Parts Represent TRUE Costs

ELECTRIC FURNACE
STEEL CASTINGS

Steel castings produced true to pattern—sound and clean, readily fitted to jigs, machinable in a minimum of time and quickly assembled into your equipment—represent the ONLY actual and true cost of steel castings.

We furnish this quality of product. And, by cooperating with your engineers in matters of design and pattern construction, assist you to secure castings of minimum weight, maximum strength and utmost economy of machining and assemblage.

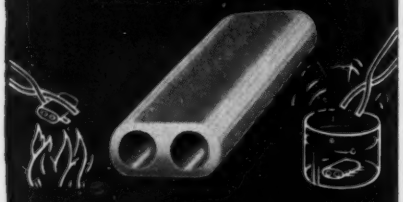
Quality controls throughout our plant assure consistent uniformity, thorough dependability and a product that is economical to use in your equipment; whether it be ships, turbines, trucks, railroad equipment or what-not.

CRUCIBLE STEEL CASTING CO.
LANSDOWNE, Del. Co., PENNA.

UNIVERSITY OF MICHIGAN LIBRARIES

Be Certain WITH "SERV-RITE

THERMOCOUPLE INSULATORS



This Gordon Thermocouple Insulator, heated red hot and plunged into cold water, came out just as good as new

Available only through GORDON, Serv-rite Thermocouple Insulators are made to stand the gaff of excessive thermal shock far above normal requirements.

For sturdy and reliable thermocouple insulator performance to meet peak production needs — Specify Serv-rite...a Gordon development backed by 32 years' experience in supplying industry with insulators that last longer and give better results.

Serv-rite Thermocouple Insulators—in any type or size—can be supplied immediately from Gordon's large stocks in the Chicago and Cleveland Plants. Remember—you can always distinguish Serv-rite Insulators by their *tan* color.

Fish Spine Beads — Asbestos String
Asbestos Tubing — Single Hole
Double Hole Round — Double Hole Oval

CLAUD S. GORDON CO.

Specialists for 32 Years in the Heat Treating and Temperature Control Field

Dept. 14 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 14 • 2035 Hamilton Ave., Cleveland 14, Ohio

Oil Co. of California. Groundwork for the new refining plant already is completed. The main structure will be a catalytic cracking unit which will greatly increase western production of high octane gasoline.

WISCONSIN

MADISON, WIS.—International Harvester Co. has been granted a permit by building inspection superintendent Ray F. Burt to erect a warehouse, estimated cost $180,000, at 2320 Darwin Rd.

MILWAUKEE—Work is expected to start soon on a $180,000 addition to the Standard Supply Co., 1045 N. Fifth St., and bids are being taken. It will occupy a vacant lot adjoining the present building.

FERROALLOYS

(*Concluded from Page* 189)

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l., lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.40c per lb of alloy, ton lots packed 8.80c, 200 to 1999 lb 9.15c, smaller lots 9.65c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8% Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); Gross tons per carload, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.